TYPICAL DESIGNS

of

TIMBER STRUCTURES

Compliments of:

TIMBER
ENGINEERING
COMPANY
1319 Eighteenth St. N. W.
WASHINGTON, D. C.

A Reference for Use of Architects and Engineers

Property of:
H.A.BENSON &
GEO.H.CHRISTY
ARCHITECTS.
Book No. 24459

THIS BOOK is dedicated to the architects and engineers, who, by their imagination, perseverance and skill, make the Western Hemisphere a better place in which to toil, play and rest and whose cooperation has made it possible to present this information to their associates.

These typical designs have been prepared as a service to architects and engineers to aid in the solution of their timber design problems. They were not prepared for any specific project. It is hoped these suggestions will assist the designer in determining satisfactory methods of arrangement of members, joint details and approximate quantities required for various loads, spacings and spans.

This book is offered to architects and engineers as a permanent addition to their technical library. It is assembled in loose-leaf form. Additional information will be supplied from time to time in the interest of increasingly efficient use of lumber as a structural material.

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TIMBER ENGINEERING COMPANY

WASHINGTON, D. C.

TYPICAL DESIGNS OF TIMBER STRUCTURES

TECO TYPICAL PLANS

The Timber Engineering Company, trade name TECO, is a subsidiary of the National Lumber Manufacturers Association organized for the purpose of better use of timber as a structural material. Among TECO's activities is the preparation of typical plans of timber structures to be used by architects and engineers as a guide in the preparation of their timber designs for specific purposes.

Over the past few years the TECO engineering department has built up a file of these typical plans and has distributed them to architects and engineers on request. A group of 45 of these plans has been assembled into this book and is presented in this form as a ready reference book for architects and engineers so that they may have the information at hand whenever the need arises. Additional plans will be distributed from time to time to owners of this looseleaf book. TECO publishes an additional booklet "Typical Lumber Designs" which lists some 470 designs including those herein illustrated. All engineers and architects should have a copy of that booklet in their library.

TECO CONNECTORS

TECO connectors are fully explained in other literature of the Timber Engineering Company which is listed herein. The intention of this book is to present designs rather than tell the story of the connector system of construction. TECO connectors simplify designing, improve construction methods, provide more efficient use of lumber, require less hardware, mean more economical and more attractive structures. The various connectors marketed by TECO are shown on the right hand margin of this sheet.

TIMBER DESIGN INFORMATION

Up-to-date complete information on timber design is readily available from the National Lumber Manufacturers Association and the Timber Engineering Company. The large amount of these data is based on the research carried on by the U. S. Forest Products Laboratory at Madison, Wisconsin. The following is a list of the various design literature available from these sources with a brief explanatory note as to the contents of each. THE TIMBER ENGINEERING COMPANY WILL SUPPLY A COMPLETE SET OF THIS DESIGN INFORMATION TO THE OWNERS OF THIS BOOK FREE OF CHARGE ON REQUEST. Only one copy of Wood Structural Design Data will be supplied free to each owner of this book but additional copies of the other publications will be supplied on request.

WOOD STRUCTURAL DESIGN DATA is a 300-page book published by the National Lumber Manufacturers Association. It contains complete tables of safe loads for wood joists, beams and columns covering the full range of commercial sizes, species and grades, and of the spans and heights ordinarily used. The book contains in addition much information on the grading of structural timber, properties of sections, board feet per linear foot and other data useful to designers. Price $1.00 per copy; with following supplements $1.25, U. S. postage paid.

WOOD STRUCTURAL DESIGN DATA SUPPLEMENTS:

SUPPLEMENT 1—Working Stresses for Structural Lumber and Timber.

SUPPLEMENT 2—Bolted Wood Joints-safe loads.

SUPPLEMENT 3—Maximum Spans for Joists and Rafters.

SUPPLEMENT 4—Wood Columns-safe loads.

SUPPLEMENT 5—Wood Trusses-stress coefficients, length coefficients and angles.

SUPPLEMENT 6—Manual of Timber Connector Construction.

SUPPLEMENT 7—Stud Walls-safe axial loads.

DESIGNING TIMBER CONNECTOR STRUCTURES. 24 pages. Describes connector uses and their action in joints; gives design procedure for joints and structures, also the method for designing members with combined axial and side loading. Free.

THE MANUAL OF TIMBER CONNECTOR CONSTRUCTION. A 16-page bulletin giving technical data on Teco connectors. This Manual contains complete information for the use of engineers in designing connector system wood structures. Data are based on test information obtained from U. S. Forest Products Laboratory.

MODERN TIMBER ROOF TRUSSES. A 12-page bulletin of typical roof truss designs, cost comparisons and fire safety data. Free.

ENGINEERING IN TIMBER. A 24-page pictorial and descriptive presentation of Teco timber structures. Free.

TYPICAL LUMBER DESIGNS. A bulletin listing 470 typical designs for various types of light and heavy frame structures. Designs include quantities and materials lists. Free.

INSTALLING TECO TIMBER CONNECTORS IN LIGHT AND HEAVY STRUCTURES. Pictorial booklet showing fundamental procedure for installing connectors in timber joints. Free.

TYPES OF TRUSSES

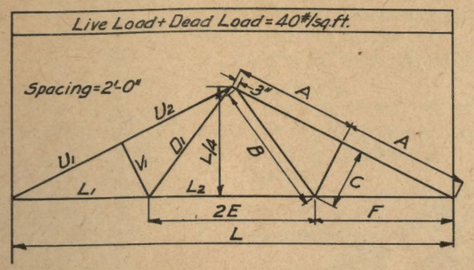
The following is a listing of the types of designs as they occur in this book. At the start of each section will be found a photograph and short description of each type of structure. This listing is presented to enable the user to find the type he wishes more promptly.

PITCHED TRUSSED RAFTERS
PITCHED FINK TRUSSES
PITCHED PRATT AND BELGIAN TRUSSES
MARKET ROOFS
SCISSORS TRUSSES
FLAT PRATT TRUSSES
BOWSTRING TRUSSES
FACTORY TRUSSES
GRANDSTANDS
DISTILLERY RACKS
BRIDGES AND TRESTLES
TANKS AND LOOKOUT TOWERS
AIRPLANE HANGARS
MISCELLANEOUS DESIGNS

PITCHED TRUSSED RAFTERS

USES: Pitched trussed rafters are most adaptable to spans up to forty feet. The spacing between rafters is usually taken as two feet. Sheathing is applied directly to the upper chord members and the ceiling lath is applied directly to the bottom chord. The use of trussed rafters eliminates the necessity for bearing partitions thus allowing lighter partitions placed at any convenient location or no partitions at all.

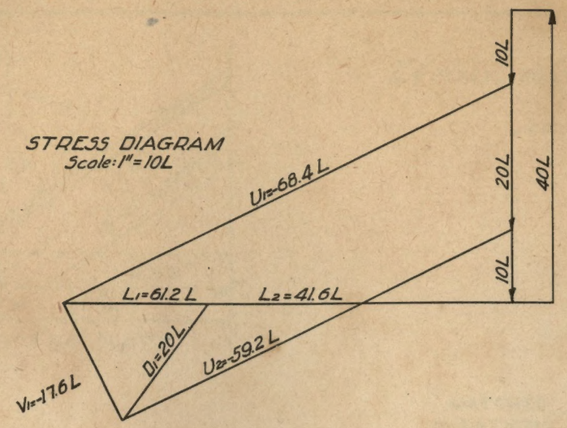
Depending upon the loads occurring at the various joints, a trussed rafter may be made up of a combination of joints using nails, bolts and connectors. Trussed rafters of this type have received wide usage in housing projects of the U.S.H.A. and have been reported to be both economically and structurally sound.



L/SPAN	A	B	C	E	F	L/4
20'	5'-7 1/16"	6'-0 5/16"	2'-9 9/16"	3'-9"	6'-3"	5'-0"
24'	6'-8 1/2"	7'-3 9/16"	3'-4 1/8"	4'-6"	7'-6"	6'-0"
28'	7'-9 9/16"	8'-6 9/16"	3'-10 9/16"	5'-3"	8'-9"	7'-0"
32'	8-11 5/16"	9'-9 9/16"	4'-5 9/16"	6'-0"	10'-0"	8'-0"
36'	10'-0 9/16"	11'-0 9/16"	5'-0 9/16"	6'-9"	11'-3"	9'-0"
40'	11'-2 1/8"	12'-3 9/16"	5'-7 1/16"	7'-6"	12'-6"	10'-0"

TABLE OF c. to c. DIMENSIONS

STRESS DIAGRAM
Scale: 1" = 10L



Span	Panel Load	U_1	U_2	V_1	D_1	L_1	L_2
20'	400	-1370	-1180	-352	400	1225	831
24'	480	-1645	-1420	-423	480	1470	998
28'	560	-1920	-1660	-493	560	1710	1160
32'	640	-2195	-1890	-563	640	1960	1330
36'	720	-2470	-2130	-634	720	2200	1500
40'	800	-2745	-2360	-704	800	2450	1660

TABLE OF LOADS IN POUNDS

LUMBER LISTS PER TRUSS

Knee Braces not included.

SPAN-20'-0"

1 Piece	2"x6"x16'-0"	16 Ft. B.M.
1 "	2"x6"x14'-0"	14 "
4 "	2"x4"x10'-0"	27 "
1 "	2"x4"x12'-0"	8 "
	Total-	65 Ft. B.M.

SPAN-24'-0"

1 Piece	2"x6"x16'-0"	16 Ft. B.M.
1 "	2"x6"x18'-0"	18 "
5 "	2"x4"x12'-0"	40 "
	Total-	74 Ft. B.M.

SPAN-28'-0"

2 Pieces	2"x6"x18'-0"	36 Ft. B.M.
5 "	2"x4"x14'-0"	47 "
	Total-	83 Ft. B.M.

SPAN-32'-0"

2 Pieces	2"x8"x20'-0"	54 Ft. B.M.
1 "	2"x8"x2'-0"	3 "
4 "	2"x4"x16'-0"	43 "
1 "	2"x4"x12'-0"	8 "
	Total-	108 Ft. B.M.

SPAN-36'-0"

2 Pieces	2"x8"x22'-0"	59 Ft. B.M.
1 "	2"x8"x2'-0"	3 "
4 "	2"x4"x18'-0"	48 "
1 "	2"x4"x12'-0"	8 "
	Total-	118 Ft. B.M.

SPAN-40'-0"

2 Pieces	2"x8"x24'-0"	64 Ft. B.M.
1 "	2"x8"x2'-0"	3 "
4 "	2"x4"x20'-0"	54 "
1 "	2"x4"x12'-0"	8 "
	Total-	129 Ft. B.M.

HARDWARE LISTS PER TRUSS

20', 24', 28' Spans

22 TECO Toothed Rings-2"
14 Machine Bolts-1/2"x6"
2 " " 1/2"x4 1/2"
2 Angles-4"x4"x1/4", 3" long
2 Lag Screws-1/2"x3"
28 Plate Washers-2"x2"x3/16"

32', 36', 40' Spans

22 TECO Toothed Rings-2 5/8"
14 Machine Bolts-5/8"x6"
2 " " 5/8"x4 1/2"
2 Angles-4"x4"x1/4", 3" long.
2 Lag Screws-1/2"x3"
28 Plate Washers-2"x2"x3/16"

When Knee Brace is used.
Add - 2-2"x4"
4 T.R.
2 B-4 1/2" long.
2 B-6" long.

NOTE:
In spans of 20', 24', and 28', use 2"x6" top chord and connection block, and all 2" toothed rings and 1/2" bolts. In spans of 32', 36', and 40', use 2"x8" top chord and connection block, and all 2 5/8" toothed rings and 5/8" bolts. If necessary to splice top chord, use splice similar to one shown for lower chord, using splice plates of same size as top chord.

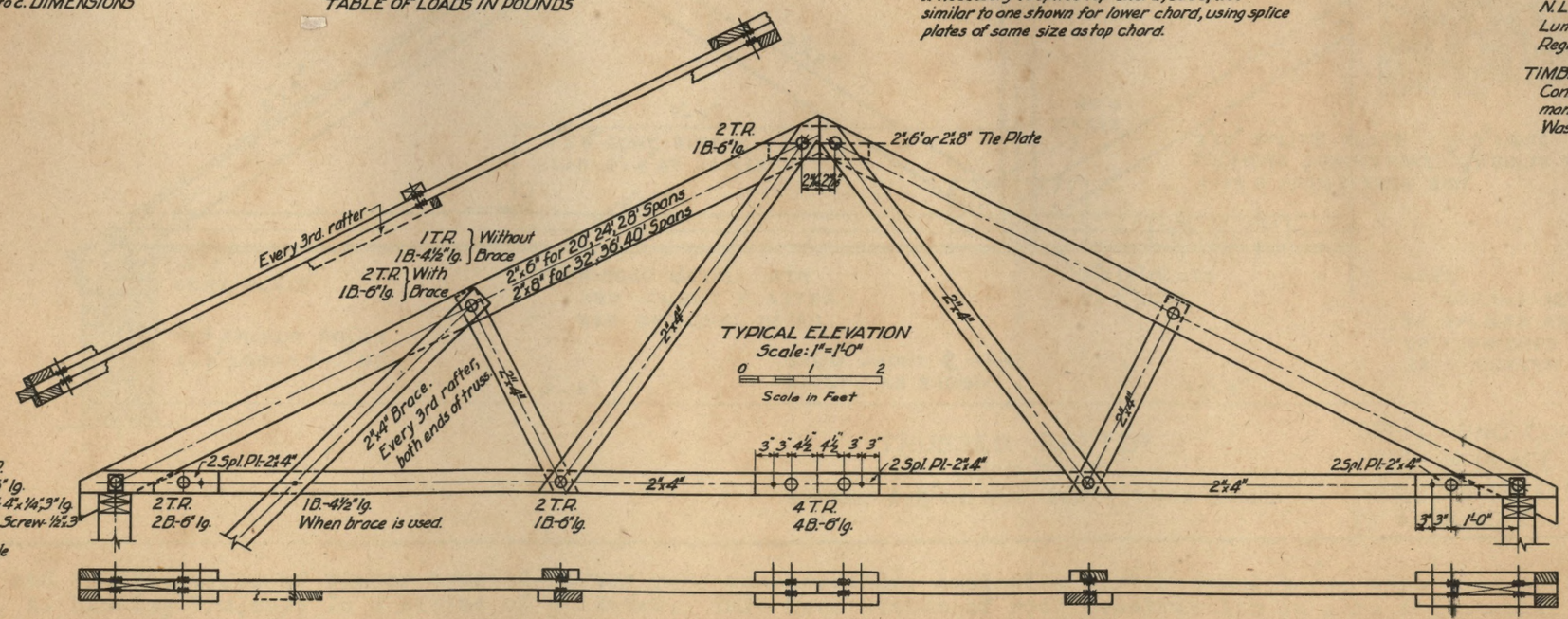
SPECIFICATIONS.

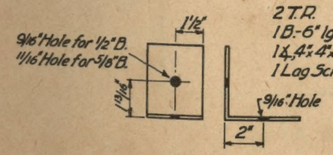
LUMBER (S4S)

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:
880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.
Allowable unit working stresses for commercial grades of lumber are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO toothed rings as manufactured by the Timber Engineering Company, Washington, D.C.



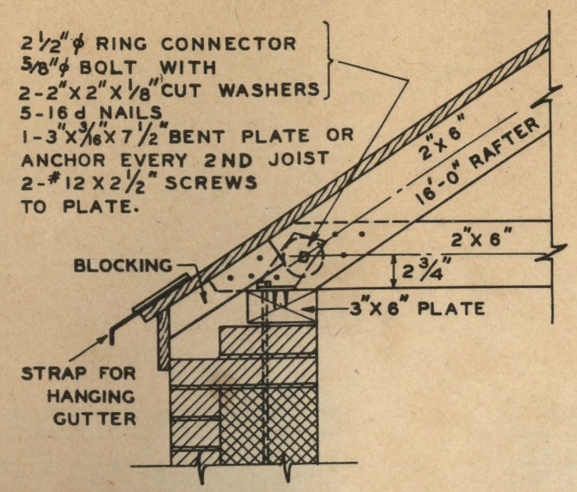


DETAIL OF ANGLE
Scale: 3" = 1'-0"

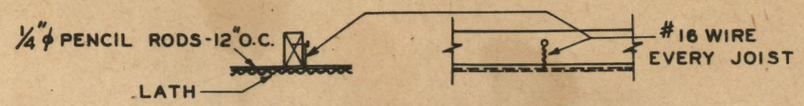
Typical design for use of Engineers and Architects.

TIMBER ENGINEERING COMPANY WASHINGTON, D. C. TRUSSED RAFTER SPANS-20', 24', 28', 32', 36', 40' PITCH-1/4	
SCALE As shown. SHEET 1 OF 1	
TRACED BY W. ADAM DATE 5/15/37	DRAWING NO.
DESIGNED BY J.H. CARR 12/22/36	39
CHECKED BY F.R.C. 5/15/37	

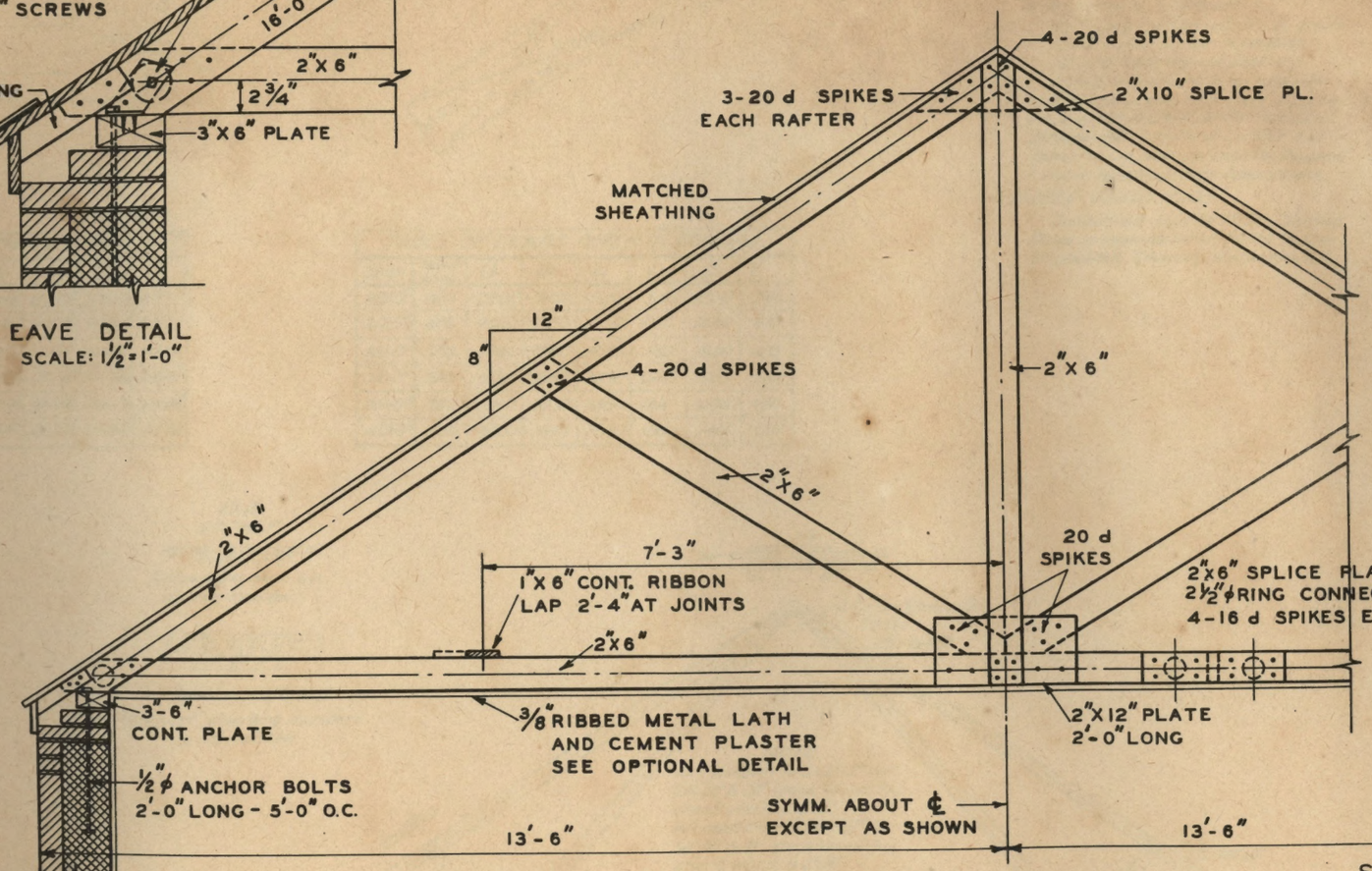
Rev. N.M. J.H.C. 10/26/39



EAVE DETAIL
SCALE: 1 1/2" = 1'-0"



OPTIONAL DETAIL
FOR CEILING CONSTRUCTION



TRUSSED RAFTER
SCALE: 3/4" = 1-0
SPACING: 23 1/2" O.C. FOR 1200# f GRADE LUMBER

TABLE OF LOADS

DEAD LOAD	
ROOF	
SLATE SHINGLES	9#
SHEATHING	3#
JOISTS	3#
	15 X 1.2 = 18#
CEILING	
PLASTER	12#
JOISTS	3#
INSULATION	2#
	17 = 17#
LIVE LOAD	30#
TOTAL (HORIZ. PROJ.)	65#/□'

RING CONNECTORS

SPLIT-RING TIMBER CONNECTORS SHALL BE MANUFACTURED FROM HOT ROLLED, LOW CARBON STEEL CONFORMING TO A.S.T.M. STANDARD SPECIFICATIONS FOR CARBON STEEL A 17-29, TYPE A, GRADE 1. EACH RING SHALL FORM A CLOSED TRUE CIRCLE WITH AN OUTSIDE CYLINDRICAL SURFACE PARALLEL TO THE AXIS OF THE RING. THE INSIDE SURFACE SHALL BE BEVELED FROM THE MEDIAN LINE TOWARD THE EDGES. IT SHALL BE CUT THROUGH IN ONE PLACE IN ITS CIRCUMFERENCE TO FORM A TONGUE AND SLOT. SPLIT-RINGS SHALL CONFORM TO THOSE MANUFACTURED BY THE TIMBER ENG. CO. WASH., D.C.: DIAMETER 2-1/2", THICKNESS OF METAL-CENTER .163", EDGE .143", AND DEPTH 3/4".

NOTE:
CEILING JOISTS MAY BE SPLICED AS SHOWN OR FURNISHED IN ONE 26'-0" LENGTH

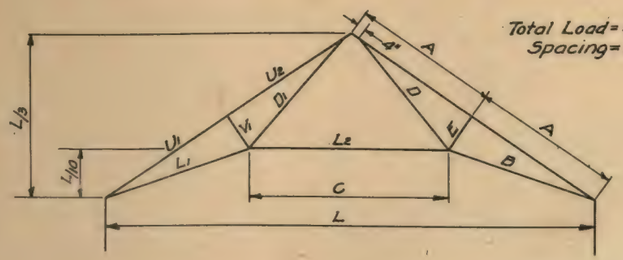
SPLIT-RING CONNECTORS ARE USED IN PLACE OF TOOTHED-RINGS WHEN ELECTRIC POWER IS AVAILABLE.

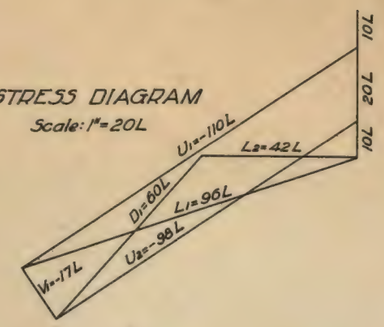
This and similar types of timber trussed-rafter roof construction, employing timber connectors, were used during 1936-1937 on 8 P. W. A. Housing Projects in 8 cities of 6 states. This Teco system of roof construction is also acceptable, and is being widely used, under the new U. S. Housing Authority program. Over 60 Housing Authority projects in practically every state and possession, where Authorities are formed, are using or have specified this simple and very economical method of pitched roof framing. The use of timber provides a maximum of employment for local labor and locally available materials.

Typical Design #157-C
May 1, 1940

TIMBER ENGINEERING COMPANY
1337 Connecticut Avenue
Washington, D. C.

See reverse side for list of Housing Projects, Lumber and Connector Literature.





SPECIFICATIONS

LUMBER (S45).

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS.

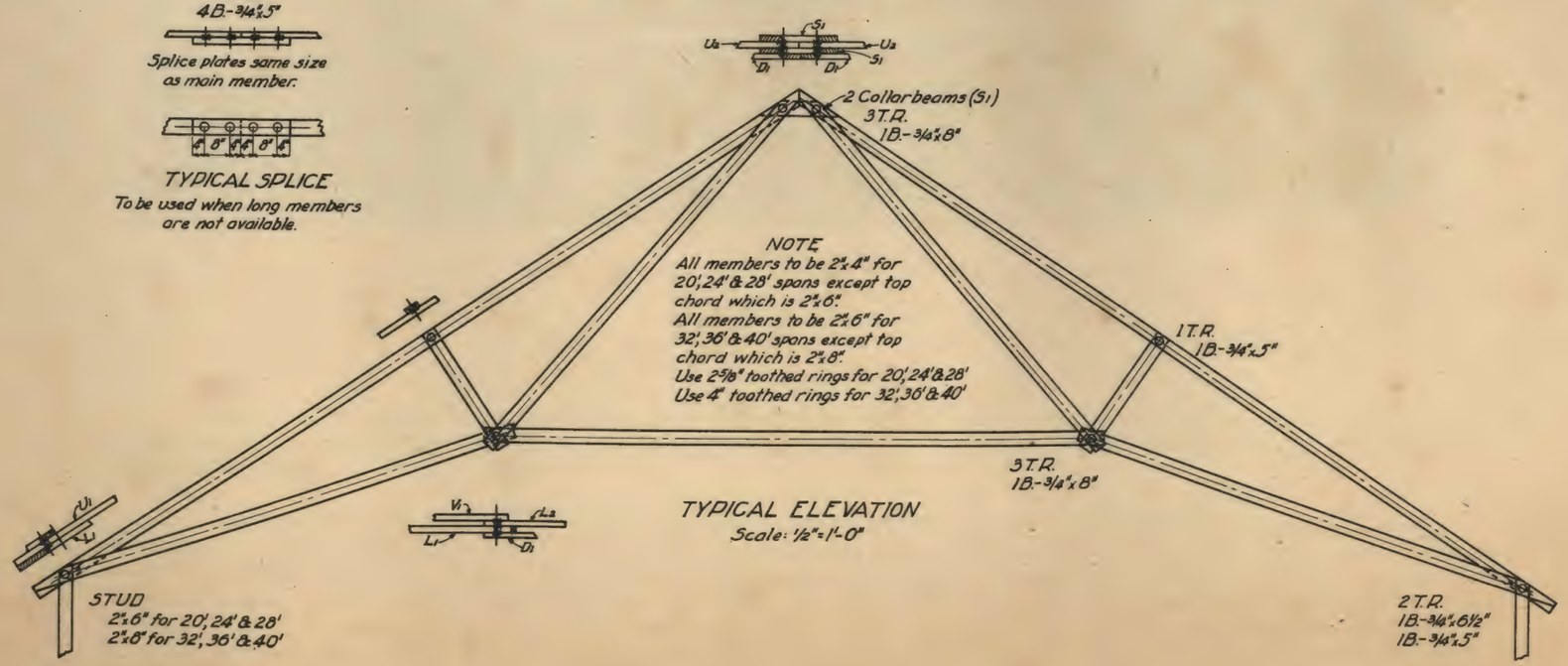
Connectors shall be TECO Toothed Rings as manufactured by the Timber Engineering Company, Washington, D.C.

LUMBER CUTTING BILL PER TRUSS						
	SPANS					
Pc. Mk.	20'	24'	28'	32'	36'	40'
U_1-U_2	2-2"x6"x13'-4 1/16"	2-2"x6"x15'-9"	2-2"x6"x18'-0"	2-2"x8"x20'-6 9/16"	2-2"x8"x22'-11 5/8"	2-2"x8"x25'-4 11/16"
L_1	2-2"x4"x7'-8 5/8"	2-2"x4"x8'-11 9/16"	2-2"x4"x10'-2 1/2"	2-2"x6"x11'-5 1/2"	2-2"x6"x12'-8 3/8"	2-2"x6"x13'-11 1/4"
L_2	1-2"x4"x8'-10 3/16"	1-2"x4"x10'-5 13/16"	1-2"x6"x12'-2 1/16"	1-2"x6"x13'-9 7/8"	1-2"x6"x15'-5 9/16"	1-2"x6"x17'-1 3/16"
D_1	2-2"x4"x6'-11 3/16"	2-2"x4"x8'-2"	2-2"x4"x9'-5"	2-2"x6"x10'-9"	2-2"x6"x12'-0"	2-2"x6"x13'-3"
V_1	2-2"x4"-2'-2"	2-2"x4"x2'-7 1/16"	2-2"x4"x2'-10 9/16"	2-2"x6"x3'-2 9/16"	2-2"x6"x3'-6 9/16"	2-2"x6"x3'-10 3/16"
Collar B.	2-2"x4"x1'-9"	2-2"x4"x1'-9"	2-2"x4"x1'-9"	2-2"x6"x2'-0"	2-2"x6"x2'-0"	2-2"x6"x2'-0"
Order	2-2"x6"x14'	2-2"x6"x16'	2-2"x6"x18'	2-2"x8"x22'	2-2"x8"x24'	2-2"x8"x26'
	5-2"x4"x10'	4-2"x4"x10'	2-2"x4"x12'	5-2"x6"x14'	2-2"x6"x12'	2-2"x6"x16'
		1-2"x4"x16'	3-2"x4"x14'		1-2"x6"x16'	3-2"x6"x18'
					2-2"x6"x18'	
Total Bd. Ft.	61	70	80	129	140	156

HARDWARE PER TRUSS
18 TECO Toothed Rings.
(2 5/8" Φ for 20', 24', 28' spans)
(4" Φ for 32', 36', 40' spans)
4 Machine Bolts - 3/4" x 5"
2 " " 3/4" x 6 1/2"
4 " " 3/4" x 8"
20 Plate Washers - 2 1/2" x 2 1/2" x 1/4" for 20', 24', 28' spans.
20 " " 3 1/2" x 3 1/2" x 3/16" for 32', 36', 40' spans.

TABLE OF CENTER TO CENTER DIMENSIONS							
L	L/3	L/10	A	B	C	D	E
20'-0"	6'-8"	2'-0"	6'-0 1/16"	6'-2 5/16"	8'-2 29/32"	5'-10 3/16"	1'-7 1/32"
24'-0"	8'-0"	2'-4 3/16"	7'-2 17/32"	7'-5 9/16"	9'-10 9/32"	7'-1 15/16"	1'-11 15/16"
28'-0"	9'-4"	2'-9 5/16"	8'-4 3/32"	8'-8 17/32"	11'-6 1/16"	8'-4 5/16"	2'-2 23/32"
32'-0"	10'-8"	3'-2 1/32"	9'-7 3/16"	9'-11 13/32"	13'-1 7/16"	9'-7 17/32"	2'-6 3/4"
36'-0"	12'-0"	3'-7 9/16"	10'-9 11/16"	11'-2 9/32"	14'-9 9/32"	10'-10 25/32"	2'-10 9/16"
40'-0"	13'-4"	4'-0"	12'-0 1/4"	12'-5 9/32"	16'-5 7/32"	12'-1 7/16"	3'-2 7/16"

TABLE OF LOADS GIVEN IN POUNDS							
Span	Panel Load	U_1	U_2	L_1	L_2	D_1	V_1
20'-0"	400	-2200	-1960	1920	840	1200	-340
24'-0"	480	-2640	-2350	2300	1010	1440	-410
28'-0"	560	-3080	-2740	2690	1180	1680	-475
32'-0"	640	-3520	-3140	3070	1340	1920	-545
36'-0"	720	-3960	-3530	3460	1510	2160	-610
40'-0"	800	-4400	-3920	3840	1680	2400	-680



Typical design for use of Engineers and Architects.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

TRUSSED RAFTER
RAISED LOWER CHORD
SPANS-20', 24', 28', 32', 36', 40'.

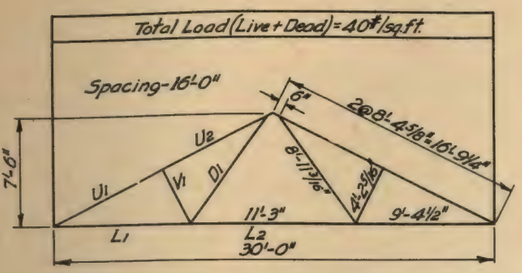
SCALE 1/2" = 1'-0"	SHEET 1	OF 1
DESIGNED BY J. CARR	DATE 6/12/37	DRAWING NO. 4
CHECKED BY F.P.C.	11/24/37	
TRACED BY W. ADAM	1/11/37	

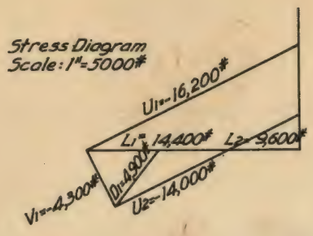
O.K. N.M. 10/30/39 J.H.C.

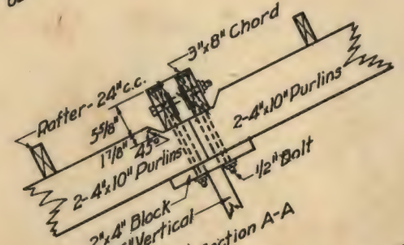
PITCHED FINK TRUSSES

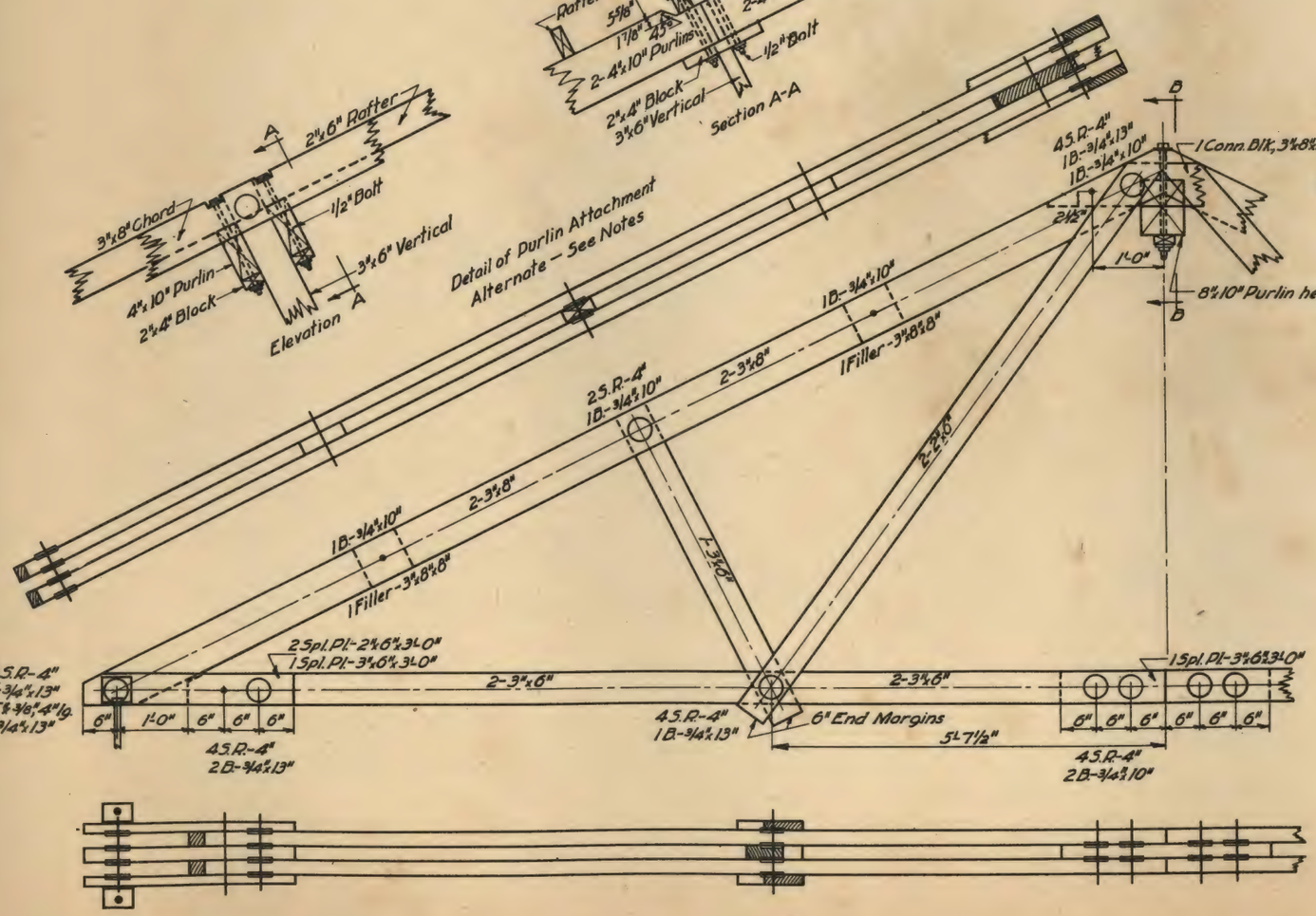
USES: Pitched Fink trusses are adaptable to pitched roofs up to eighty feet in clear span. The highest efficiency of this type of truss is reached in spans of forty to sixty feet.

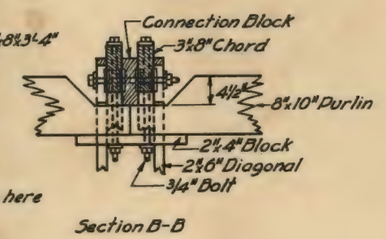
Fink trusses are particularly applicable when the slope gets above twenty-five degrees. In other types of pitched truss when a steep slope is used the compression members near the center of the span have lengths which are excessive. This factor means inefficiency because the allowable capacity of the member must be seriously reduced to counteract the high length to thickness ratio. In a Fink truss the compression members at the center are considerably shorter (usually less than one half the normal length) and therefore this inefficiency is eliminated.











NOTES

GENERAL

This truss will not take bending in the top chord hence purlins should be placed directly over the panel points, or as shown.

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

700# Compression parallel to grain.
1,100# Extreme fiber in bending.
1,100,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST PER TRUSS

(Purlins and purlin connections not included).

LUMBER (S4S).

4 Pieces	2"x6"x14'-0"	56 Ft. B.M.	
4 "	3"x6"x14'-0"	84	"
2 "	3"x6"x10'-0"	30	"
1 "	3"x8"x6'-0"	12	"
4 "	3"x8"x18'-0"	144	"
	Total -	326 Ft. B.M.	

HARDWARE

44	TECO Split Rings	4" ϕ
10	Machine Bolts	3/4"x10"
10	" "	3/4"x13"
40	Plate Washers	3"x3"x3/16"
4	Steel Angles	3 1/2"x5"x3/8"x4" lg.
4	Anchor Bolts	3/4"x13"

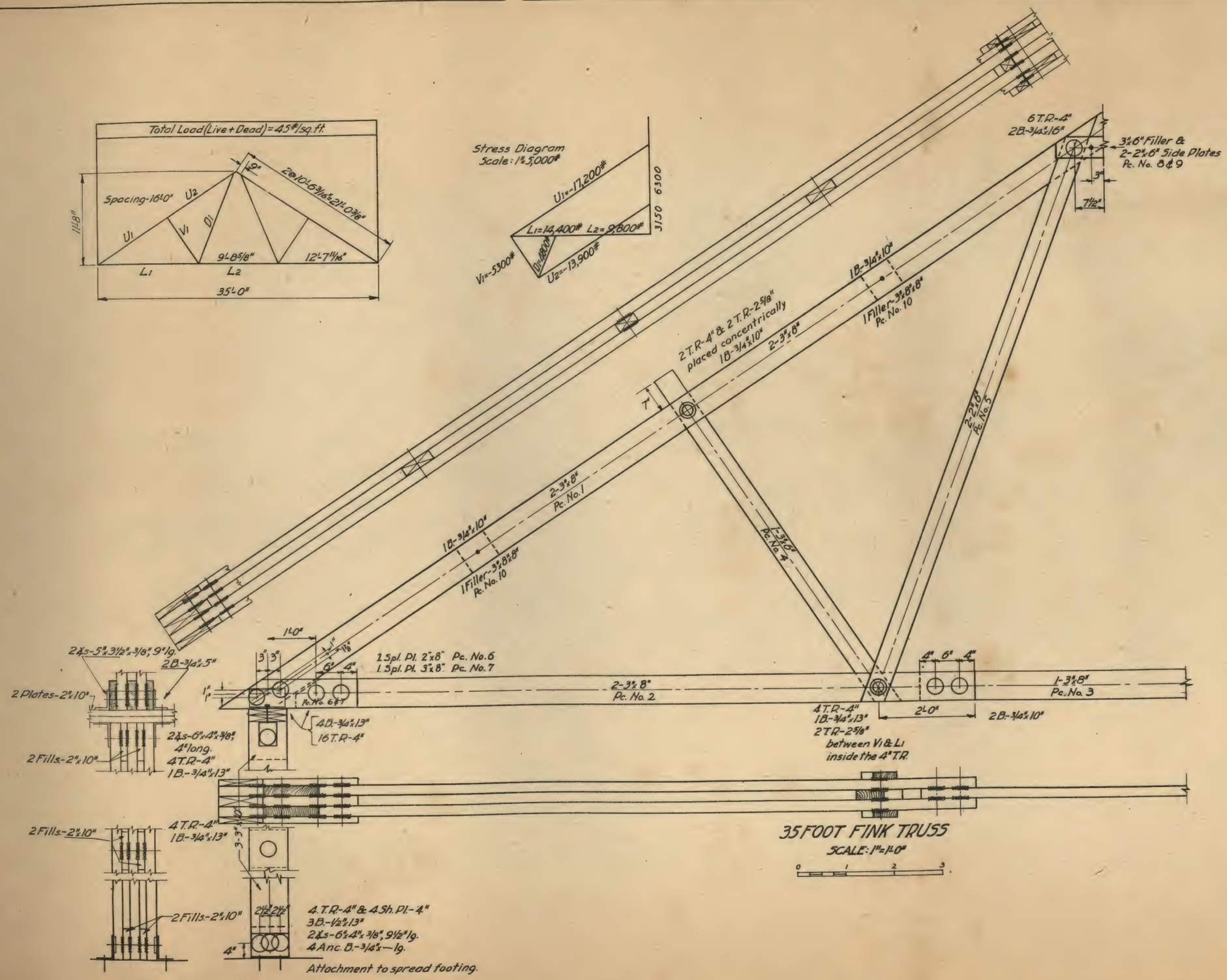
Typical design for use of Engineers and Architects

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

FINK ROOF TRUSS
SPAN-30'-0" RISE-7'-6"

SCALE 1" = 1'-0"	SHEET 1	OF 1	
	DATE	DRAWING NO.	
DESIGNED BY J. CARR	8/27/37	242	
CHECKED BY F.R.C.	2/16/38		
TRACED BY W. ADAM	3/26/38		

O.K.



NOTES

GENERAL

This truss is not designed for joists on top chord. Purlins (6"x10" or 3-2"x10") should be placed directly over the panel points, and rafters (2"x6"-24" c.c.) and 1" sheathing placed on the purlins. Purlins may be attached to the top chord with steel angles bolted to the purlins and fastened with lag screws to the top chord, or V1 and D1 may be extended and the purlins rested against them.

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO toothed rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST PER TRUSS

LUMBER CUTTING BILL

Mk.	Size	Length	Make	Cut from	Order	F.B.M.
1	3"x8"	22'-0"	4	22'-0"	4	176
2	3"x8"	15'-8"	4	16'-0"	4	128
3	3"x8"	8'-0"	1	18'-0"	1	36
4	3"x6"	7'-5"	2	10'-0"	2	30
5	2"x6"	13'-2"	4	16'-0"	4	64
6	2"x8"	2'-10"	4	12'0"	1	16
7	3"x8"	2'-10"	2	Pc. No. 3		
8	2"x6"	2'-0"	4	Pc. No. 5		
9	3"x6"	2'-0"	2	Pc. No. 4		
10	3"x8"	0'-8"	4	Pc. No. 3		
				Total F.B.M.		450

CONNECTORS

No.	Item	Size
64	Toothed Rings	4"
8	" "	2 5/8"

HARDWARE

No.	Item	Size
10	Machine Bolts	3/4" x 10"
10	" "	3/4" x 13"
4	" "	3/4" x 16"
36	Plate Washers	3 1/2"x3 1/2"x3/16"
8	Cut Washers	2" ϕ
4	Angles	5"x3 1/2"x3/8"-9 1/2"

Typical design for use of Engineers and Architects

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

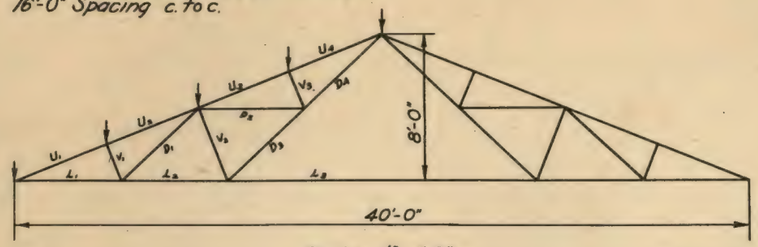
FINK ROOF TRUSS
SPAN 35' PITCH 1/3

SCALE 1" = 1'-0" SHEET 1 OF 1

	DATE	DRAWING NO.
DESIGNED BY J. CARR	5/11/37	222
CHECKED BY F.R.C.		
TRACED BY W. ADAM	3/16/38	O.K.

Rev. N.M. - A.G.D. 10/10/41

Total Live and Dead Loads = 40#/sq.ft.
16'-0" Spacing c. to c.



Scale - 1/4" = 1'-0"

MATERIALS LIST PER TRUSS						
LUMBER CUTTING BILL S4S						
Mk.	Size	Length	Make	Cut from	Order	F.B.M.
1	3"x8"	22'-4½"	4	24'-0"	4	192
2	3"x6"	19'-9"	4	20'-0"	4	120
3	3"x6"	3'-7"	2	14'-0"	1	21
4	2"x6"	7'-0"	4	14'-0"	2	28
5	3"x6"	5'-9"	2	12'-0"	2	36
6	3"x6"	5'-11"	2	Pc. No. 5		
7	3"x6"	3'-6"	2	10'-0"	1	15
8	2"x6"	12'-5"	4	16'-0"	4	64
9	2"x6"	3'-4"	4	Pc. No. 8		
10	3"x6"	3'-4	2	Pc. No. 3		
11	3"x10"	2'-10"	1	3'-0"	1	8
12	2"x6"	2'-9"	2	6'-0"	1	6
13	3"x6"	2'-9"	1	Pc. No. 7		
14	3"x6"	1'-7½"	4	7'-0"	1	11
15	3"x8"	0-8"	8	Pc. No. 1		
				Total F.B.M.		501

CONNECTORS		
No.	Item	Size
108	Split Rings	4"

HARDWARE		
No.	Item	Size
8	Machine Bolts	½" x 9"
6	" "	¾" x 9"
22	" "	¾" x 13"
2	" "	1" x 9"
4	" "	1" x 13"
84	Plate Washers	3" x 3" x 3/16"
1	Rod	¾" x 8'-8"

NOTES:

GENERAL

This truss to be used with purlins at panel points only.

LUMBER

Lumber shall be of a structual grade with minimum allowable working stresses in pounds per sq. in. as follows:

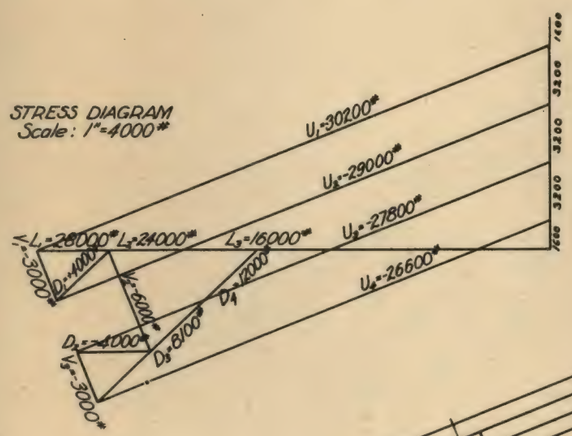
880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of Elasticity

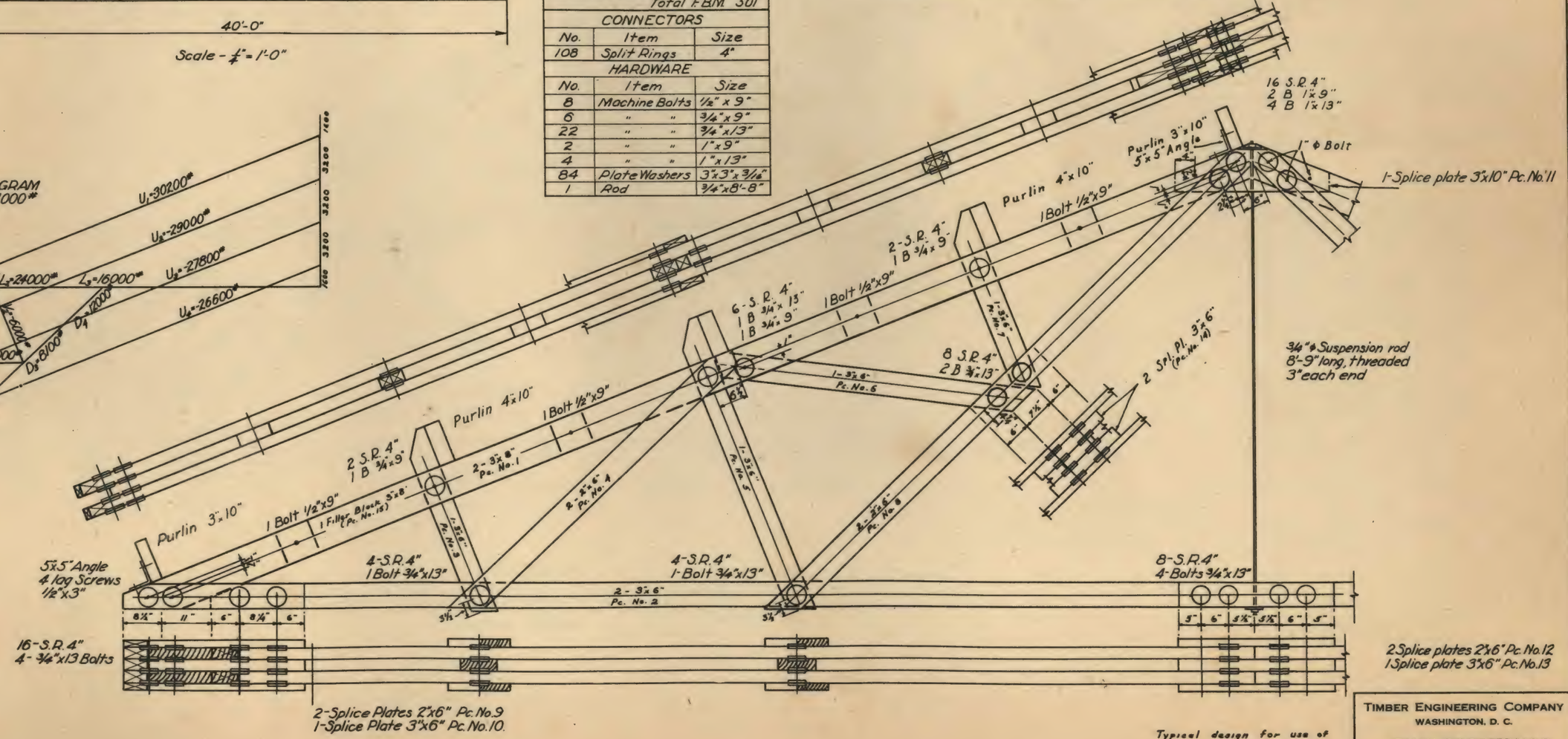
Allowable unit working stresses for Commercial grades of lumber are given in the leaflet - "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Co, Washington, D.C.

STRESS DIAGRAM
Scale: 1" = 4000#





Typical design for use of Engineers and Architects.

40'-0" FINK ROOF TRUSS

Scale - 1" = 1'-0"
0 1 2 3 4
Scale in Feet

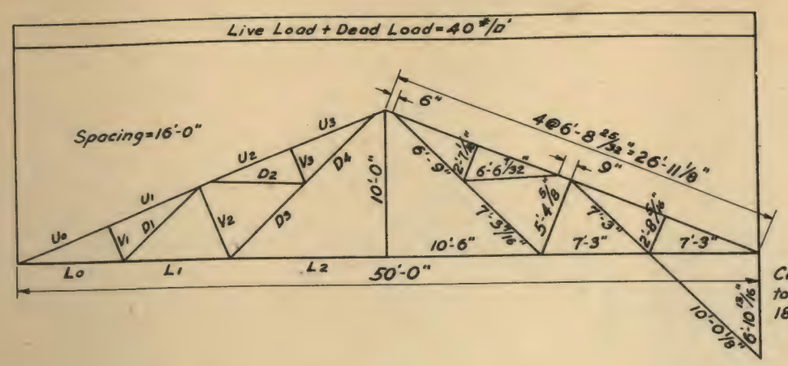
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

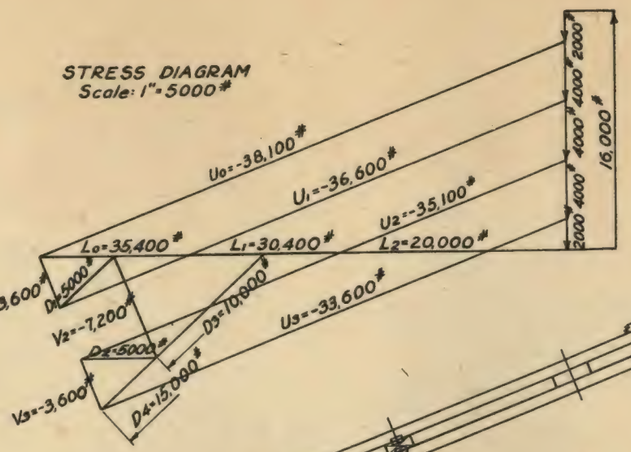
FINK ROOF TRUSS
SPAN 40'-0" RISE 8'-0"

SCALE 1" = 1'-0" SHEET 1 OF 1

	DATE	DRAWING NO.
DESIGNED BY E.S.L.	4/13/41	345
CHECKED BY A.G.D.	11/12/41	
TRACED BY W.B.M.	11/18/41	

A.K. N.M. A.G.D. 11/18/41





TIMBER CONNECTORS

Connectors shall be TECO split rings and claw plates as manufactured by the Timber Engineering Company, Washington, D. C.

CAMBER

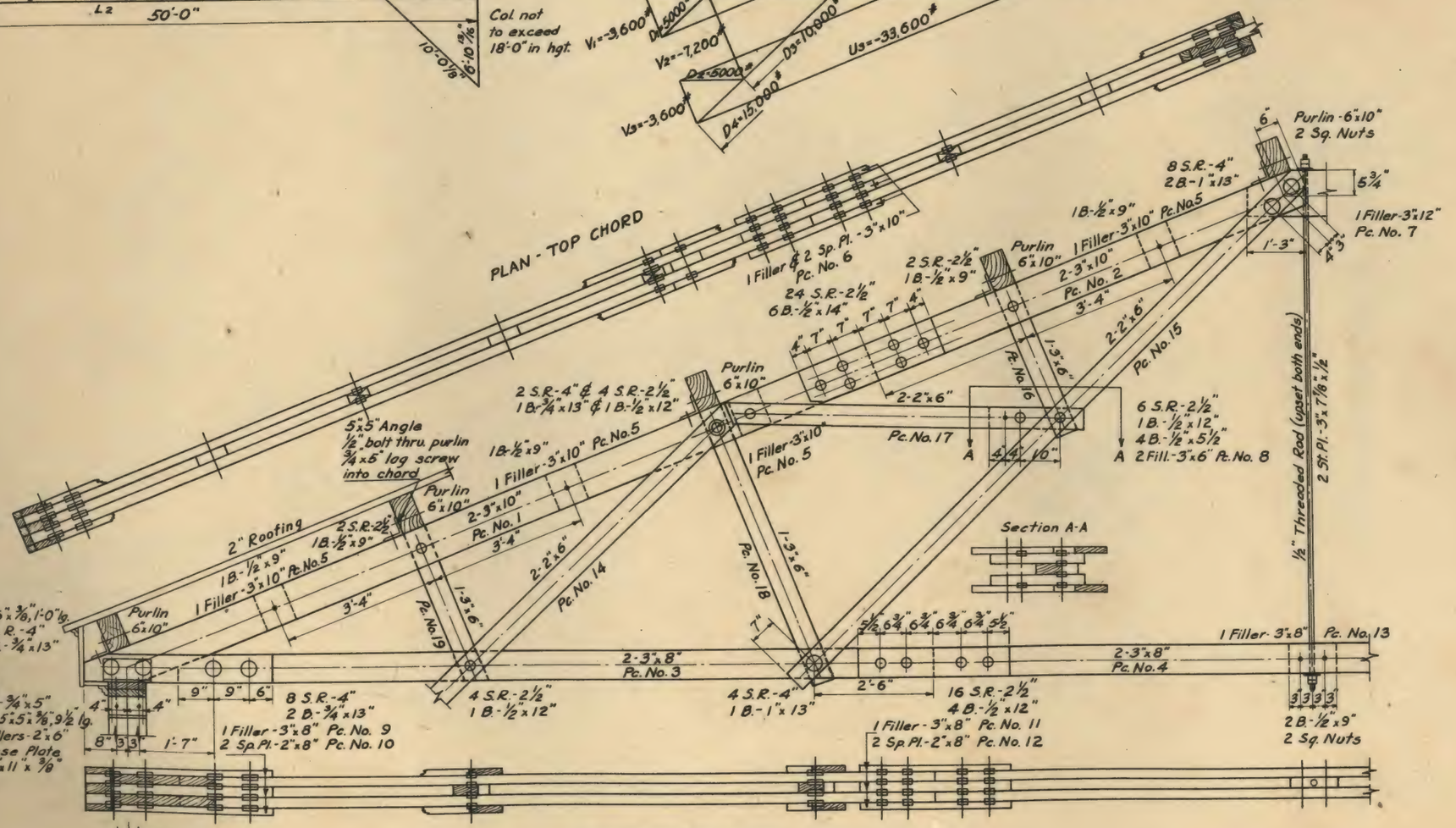
The proper camber may be introduced into this truss by raising the lower chord 1" at the center during fabrication.

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.



PLAN - BOTTOM CHORD
Scale: 3/4" = 1'-0"

0 1 2 3
Scale in Feet

MATERIALS LIST PER TRUSS						
LUMBER CUTTING BILL (S4S)						
Mk.	Size	Length	Make	Cut From	Order	F.B.M.
1	3"x10"	18'-0"	4	18'-0"	4	180
2	3"x10"	10'-0"	4	20'-0"	2	100
3	3"x8"	15'-11"	4	16'-0"	4	128
4	3"x8"	16'-0"	2	16'-0"	2	64
5	3"x10"	0'-8"	8	12'-0"	2	60
6	3"x10"	3'-0"	6	Pc. No. 5		
7	3"x12"	2'-6"	1	4'-0"	1	12
8	3"x6"	2'-0"	4	18'-0"	2	54
9	3"x8"	4'-0"	2	16'-0"	1	32
10	2"x8"	4'-0"	4	16'-0"	1	22
11	3"x8"	3'-2"	2	Pc. No. 9		
12	2"x8"	3'-2"	4	14'-0"	1	19
13	3"x8"	1'-0"	1	Pc. No. 9		
14	2"x6"	18'-6"	4	20'-0"	4	80
15	2"x6"	15'-4"	4	16'-0"	4	64
16	3"x6"	3'-5"	2	Pc. No. 8		
17	2"x6"	7'-7"	4	16'-0"	2	32
18	3"x6"	6'-4"	2	Pc. No. 8		
19	3"x6"	3'-7"	2	Pc. No. 8		
20	2"x6"	0'-9 1/2"	4	Pc. No. 14		
21	8"x10"	18'-0"	2	18'-0"	2	240
					Total F.B.M.	1087

HARDWARE		
No.	Item	Size
60	Split Rings	4" ϕ
16	Claw Plates	3 1/8" ϕ
8	Machine Bolts	1/2"x5 1/2"
12	" "	1/2"x9"
8	" "	1/2"x10"
16	" "	1/2"x12"
12	" "	1/2"x14"
8	" "	3/4"x5"
14	" "	3/4"x13"
6	" "	1"x13"
100	Plate Washers	2"x2"x1/8"
24	" "	3"x3"x3/16"
16	Cut Washers	2" ϕ
4	Angles	6"x6"x3/8", 1'-0 1/2"
4	"	5"x5"x3/8", 9 1/2" lg.
4	" welded to	4"x7"x3/8", 9 1/2" lg.
4	Steel Plates	9 1/2"x12"x3/8"
2	" "	3"x7 7/8"x1/2"
2	" "	11 1/8"x9 1/2"x3/8"
120	Split Rings	2 1/2" ϕ
8	Anchor Bolts	3/4" — lg.
1	Threaded Rod 1/2"x11'-3" threaded 3" each end.	

Typical design for use of Engineers and Architects

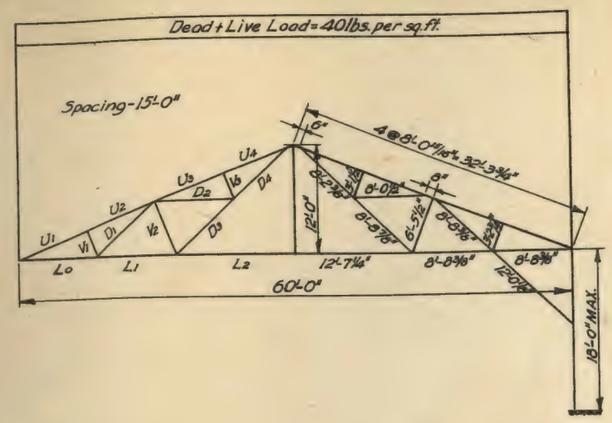
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

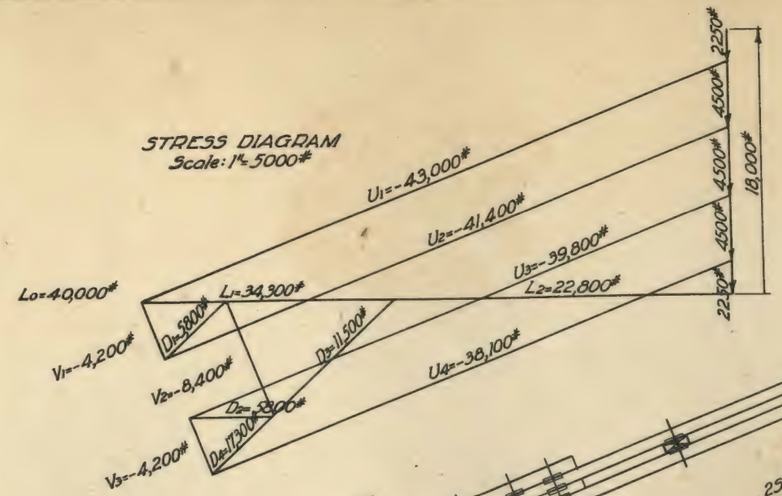
FINK ROOF TRUSS
Span-50'-0" Rise-10'-0"

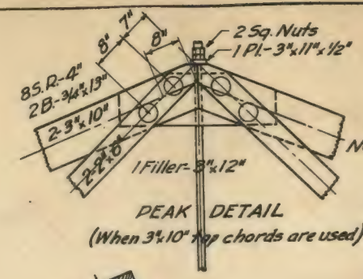
SCALE 3/4" = 1'-0" SHEET 1 OF 1

	DATE	DRAWING NO.
DESIGNED BY J.H.Carr	12/17/36	35
CHECKED BY P.L.Landsen	3/18/38	
TRACED BY A.S.Harter	12/4/39	

Revised N.M. 10/30/39 J.H.C.







PEAK DETAIL
(When 3"x10" top chords are used)

NOTES:

Top chord of 2-3"x10" may be used if purlins are used at panel points.

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

880# Compression parallel to grain.
1200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings and shear plates as manufactured by the Timber Engineering Company, Washington, D.C.

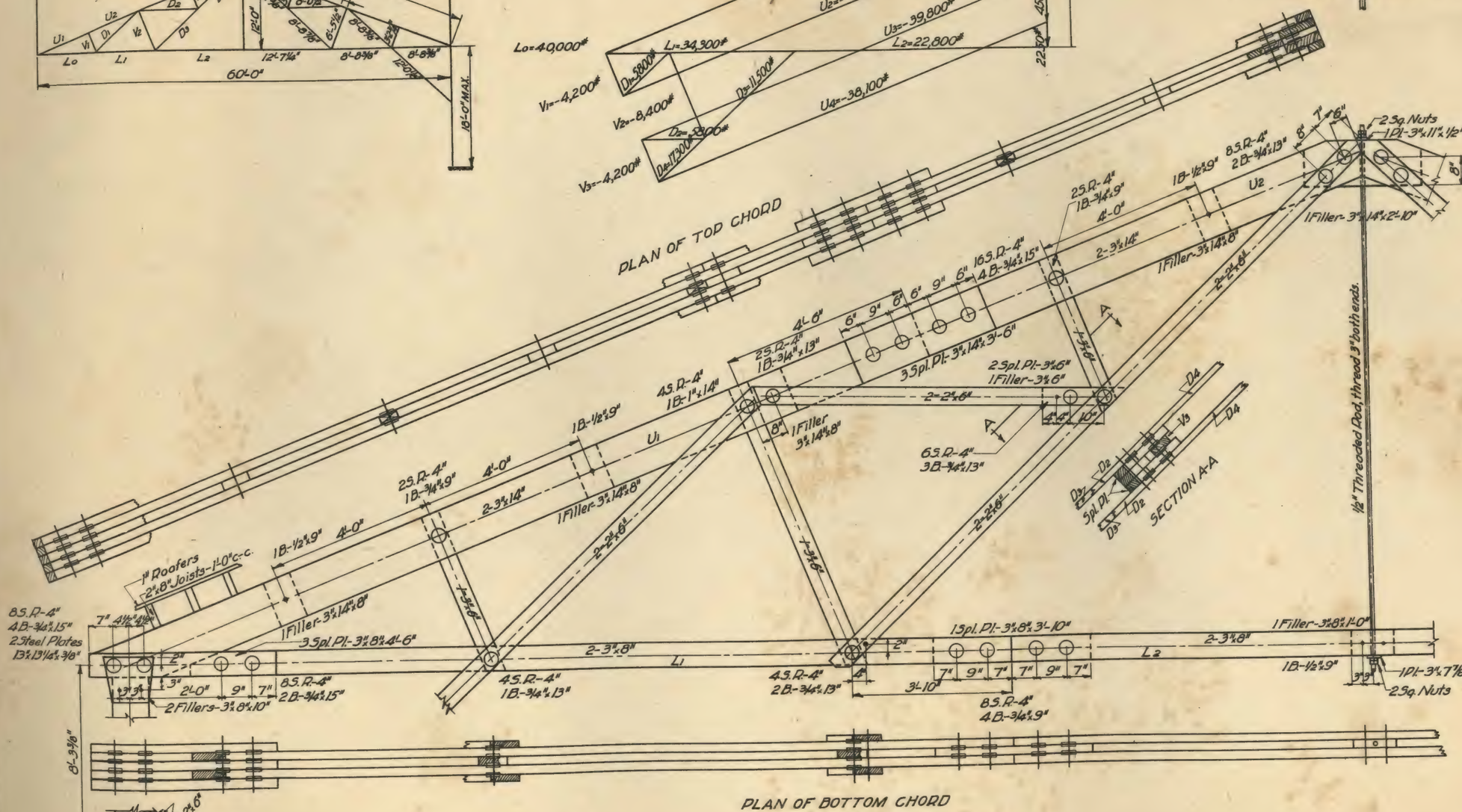
MATERIALS LIST PER TRUSS

LUMBER-S4S

6 Pieces	2"x6"x18'-0"	108 Ft. B.M.	
4 "	2"x6"x22'-0"	88	"
2 "	3"x6"x12'-0"	36	"
1 "	3"x6"x20'-0"	30	"
1 "	3"x8"x12'-0"	24	"
2 "	3"x8"x14'-0"	56	"
2 "	3"x8"x18'-0"	72	"
4 "	3"x8"x20'-0"	160	"
4 "	3"x14"x12'-0"	168	"
1 "	3"x14"x14'-0"	49	"
1 "	3"x14"x16'-0"	56	"
4 "	3"x14"x22'-0"	308	"
2 "	8"x10"x18'-0", Rough	240	"
		1395 Total Ft. B.M.	

HARDWARE

148	TECO Split Rings	4"
16	TECO Claw Plates	3 1/8"
8	Machine Bolts	1/2"x9"
8	" "	1/2"x10"
12	" "	3/4"x9"
20	" "	3/4"x13"
20	" "	3/4"x15"
2	" "	1"x14"
16	Plate Washers	2"x2"x1/8"
92	" "	3"x3"x3/16"
16	Cut Washers	2"ϕ
4	Steel Plates	10"x12"x3/8" welded to angles
4	" "	13"x13 1/4"x3/8"
1	" "	3"x7 7/8"x1/2"
1	" "	3"x11"x1/2"
4	Angles	4"x7"x3/8", 10" long
8	Anchor Bolts	3/4"ϕ, 24"
1	Steel Rod	1/2"ϕ, 13'-4" lg-thr'd. 3" both ends.
4	Square Nuts for 1/2" steel rod.	



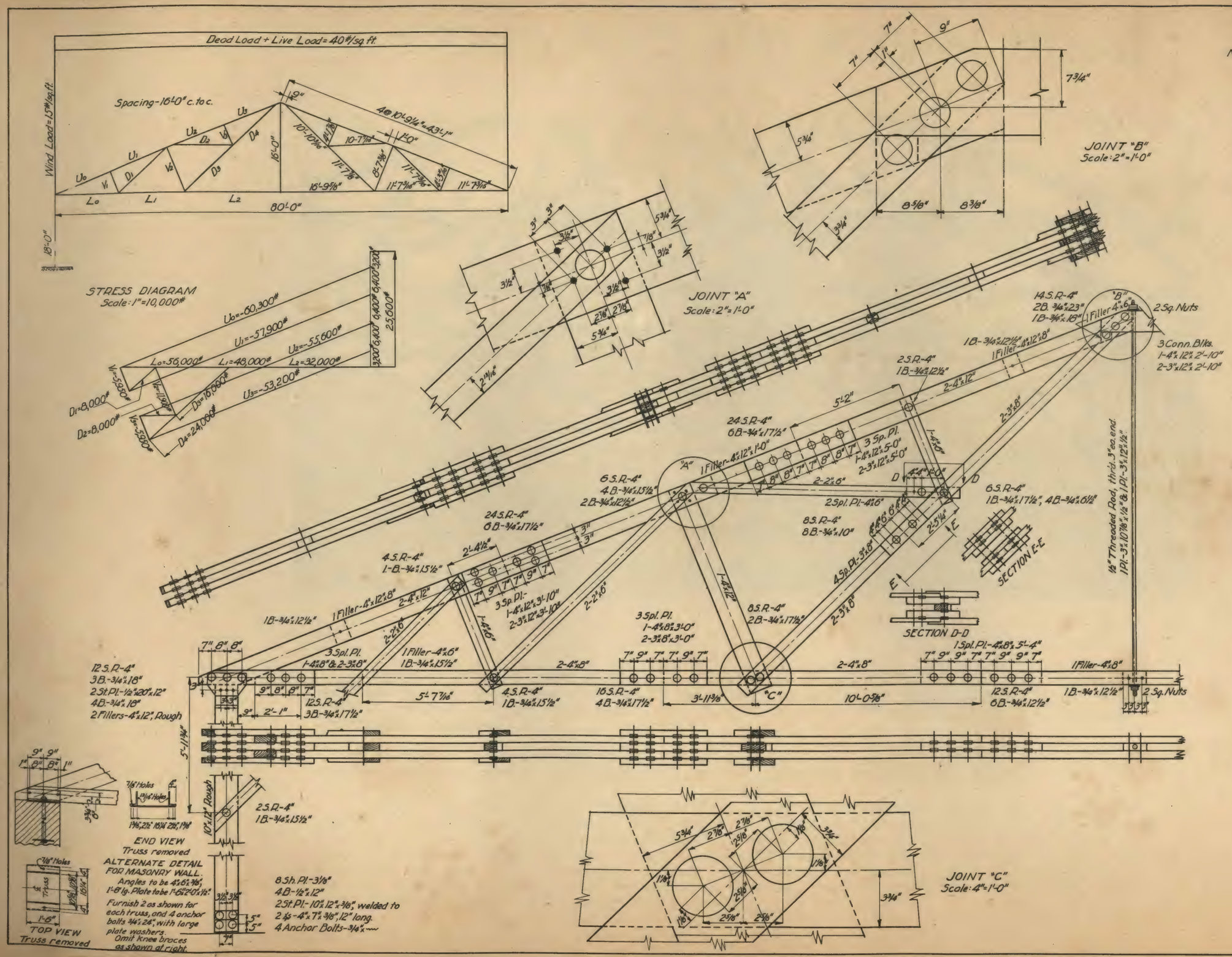
Typical design for use of Architects and Engineers.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

FINK ROOF TRUSS
SPAN-60'-0" RISE-12'-0"

SCALE 3/4"=1'-0"	SHEET 1	OF 1	
DESIGNED BY J. CARR	DATE 12.12.36	DRAWING No.	
CHECKED BY F.R.C.	11/19/37	33.	
TRACED BY W. ADAM	4.6.38		

Rev. N.M.-J.H.C.-2/27/40



NOTES:

GENERAL.

This design shall be used with 8"x10" purlins placed directly over panel points and 3"x8" rafters spaced 4'-0" on centers.

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings and shear plates as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST PER TRUSS.

LUMBER (S4S except as noted).

4	Pieces	2"x6"x12'-0"	48	Ft. B.M.
4	"	2"x6"x14'-0"	56	"
4	"	2"x6"x16'-0"	64	"
8	"	3"x8"x14'-0"	224	"
2	"	3"x8"x20'-0"	80	"
1	"	4"x8"x12'-0"	32	"
2	"	4"x6"x16'-0"	64	"
6	"	4"x8"x14'-0"	224	"
5	"	4"x8"x18'-0"	240	"
2	"	3"x12"x16'-0"	96	"
1	"	3"x12"x10'-0"	30	"
2	"	4"x12"x14'-0"	112	"
9	"	4"x12"x16'-0"	576	"
3	"	4"x12"x18'-0"	216	"
2	"	10"x12"x18'-0"	360	" Rough Size
2	"	4"x12"x6'-0"	48	" " "

Total— 2470 Ft. B.M.

HARDWARE

308	TECO Split Rings	4"
16	" Shear Plates	3 1/8"
8	Machine Bolts	1/2"x12"
8	" "	3/4"x6 1/2"
24	" "	3/4"x12 1/2"
16	" "	3/4"x15 1/2"
44	" "	3/4"x17 1/2"
16	" "	3/4"x18"
4	" "	3/4"x23"
1	Steel Plate	1/2"x3"x10 7/8"
1	" "	1/2"x3"x12"
4	" "	1/2"x20"x16"
4	" "	3/8"x10"x12" welded to
4	Angles	4"x7"x3/8", 12" long
1	Threaded Rod	17'-3" long, thr'd 3" each end
8	Anchor Bolts	3/4"x---
16	Cut Washers	2"ϕ
236	Plate Washers	3"x3"x3/16"
16	Machine Bolts	3/4"x10"
	Nuts for tie rod	

Typical design for use of Engineers and Architects

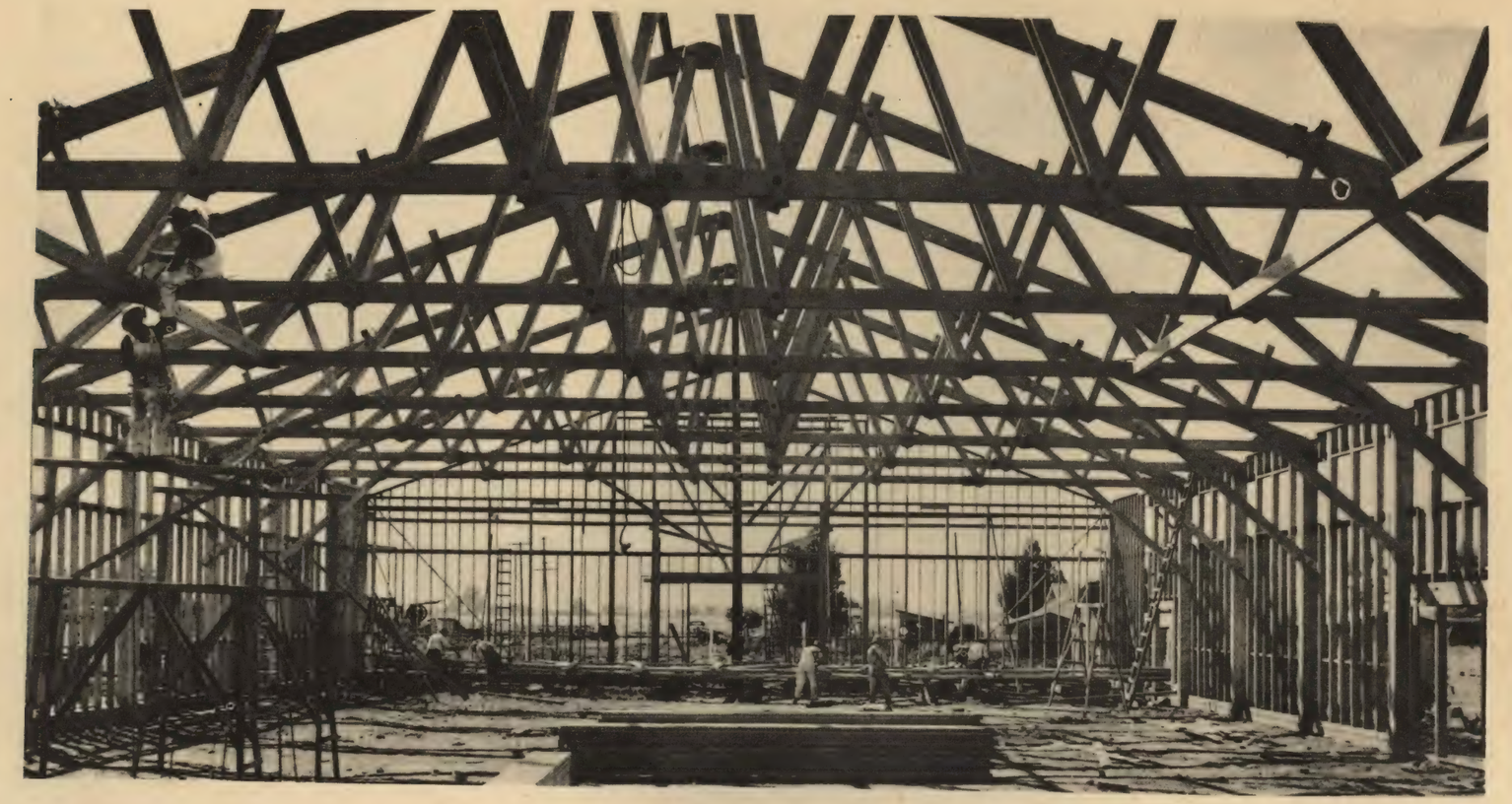
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

FINK ROOF TRUSS
SPAN-80'-0" RISE-16'-0"

SCALE 1/2" = 1'-0" SHEET 1 OF 1
TRACED BY W. ADAMS DATE 7/29/37
DESIGNED BY J. C. ARR 8/4/36
CHECKED BY F.J.H 6/19/37
DRAWING No. 10

REVISED 8/11/37 REV-N.M.-11/20/39-J.H.C.
REVISED 8/23/37

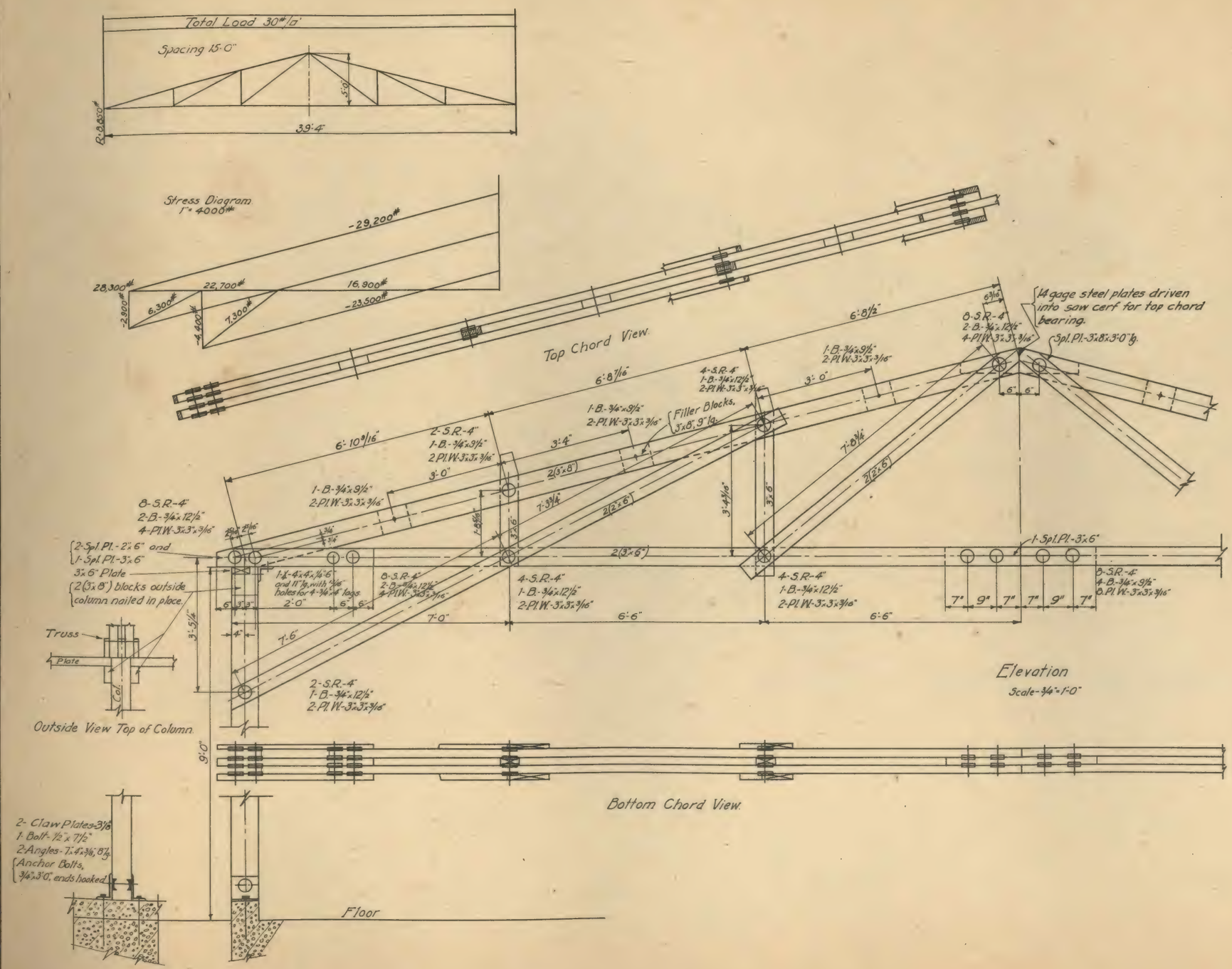
PITCHED PRATT AND BELGIAN TRUSSES



USES: Pitched Pratt or Belgian trusses are adaptable to pitched roofs up to one hundred feet in clear span. These types are more efficient than the Fink type for spans over fifty feet and are much more efficient for all spans when the slope is less than twenty-five degrees.

In addition to the efficiency the framing methods are simple since only two sets of members join the chords at any joint with the exception of the peak joint.

Pratt and Belgian type trusses have replaced the Howe type in the TECO connector system of timber construction. The Howe type was employed using steel rods for tension members because of the near impossibility of effectively and efficiently developing tension stresses in timber joints. TECO connectors have made it possible to develop tension stresses and have eliminated this difficulty. The Pratt and Belgian types have the shorter members in compression as compared with the reverse condition in the Howe and hence lead to greater efficiency and economy.



GENERAL-

This design shall be used with 6"x8" purlins placed directly over panel points and 2" roofing placed on purlins parallel to truss.

NOTES.

LUMBER SPECIFICATIONS.

Lumber shall be of a grade which provides the following safe working stresses:

1200# f (Fiber Stress).
880# c (Compression parallel with grain).
1,600,000# E (Modulus of Elasticity).

Specific grades and allowable unit working stresses are given in the attached National Lumber Manufacturers Association leaflet or are available from Regional Lumber Manufacturers Associations.

SPLIT RING CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company.

MATERIAL LISTS.

LUMBER PER TRUSS (COLUMNS NOT INCLUDED.)

4	Pieces	2"x6"x14'-0"	56 Ft. B.M.
4	"	2"x6"x16'-0"	64 "
5	"	3"x6"x20'-0"	150 "
1	"	3"x6"x8'-0"	12 "
4	"	3"x8"x22'-0"	176 "
1	"	3"x8"x6'-0"	12 "
			Total-470 Ft. B.M.

HARDWARE (COLUMNS NOT INCLUDED.)

76	Split Rings-	4" ϕ
12	Machine Bolts	3/4"x9 1/2"
16	"	3/4"x12 1/2
56	Plate Washers	3"x3"x3/16"
2	Steel Plates-14 ga.	2 3/8"x8"

Additional Hardware for Columns.

4	Split Rings	4" ϕ
4	Claw Plates	3 1/8" ϕ
2	Angles	7"x4"x3/8"x8" lg.
2	Machine Bolts	1/2"x7 1/2"
4	Anchor Bolts	3/4"x3'-0"
2	Machine Bolts	3/4"x12 1/2"
2	Angles	4"x4"x1/4", one leg 6", one 11" lg.
8	Lag Screws	3/4"x4"
4	Plate Washers	3"x3"x3/16"

Typical design for use of Engineers and Architects.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

PRATT ROOF TRUSS
SPAN 39' RISE 5'

SCALE 3/4"=1'-0" SHEET 1 OF 1

TRACED BY W. ADAM DATE 12/4/36
DESIGNED BY P. LANDSEM 3/23/36
CHECKED BY CARR 10/19/36

DRAWING NO. 176 O.K.

Rev. N.M.-J.H.C. 3/15/40

DESIGN LOADS		
Dead Load	10# per sq. ft	on horizontal projection
Snow Load	30# per sq. ft	on horizontal projection
Wind Load	20# per sq. ft.	on vertical projection

MATERIALS LIST PER TRUSS

LUMBER CUTTING BILL (S4S)

Mk.	Size	Length	Make	Cut From	Order	F.B.M.
1	3"x10"	13'-11"	4	14'-0"	4	140
2	3"x10"	14'-0"	4	14'-0"	4	140
3	3"x8"	15'-8"	2	16'-0"	2	64
4	3"x6"	16'-0"	4	16'-0"	4	96
5	3"x10"	3'-1"	1	14'-0"	1	35
6	3"x10"	3'-6"	2	Pc. No 5		
7	2"x10"	3'-6"	4	14'-0"	1	24
8	3"x8"	3'-6"	2	8'-0"	1	16
9	2"x8"	3'-6"	4	14'-0"	1	19
10	3"x6"	4'-0"	2	16'-0"	1	24
11	2"x6"	4'-0"	4	16'-0"	1	16
12	3"x10"	0'-6"	8	Pc. No 5		
13	3"x6"	3'-9"	2	Pc. No 10		
14	3"x6"	5'-9"	2	12'-0"	1	18
15	3"x6"	7'-9"	2	16'-0"	1	24
16	4"x6"	9'-9"	2	10'-0"	2	40
17	2"x6"	12'-0"	4	12'-0"	4	48
18	2"x6"	10'-7"	4	12'-0"	4	48
19	2"x6"	8'-11"	4	18'-0"	2	36
20	2"x6"	7'-6"	4	16'-0"	2	32
				Total F.B.M.		820

HARDWARE

168	Split Rings	4"ø
4	Machine Bolts	½"x4"
8	" "	½"x9½"
24	Plate Washers	2"x2"x⅛"
4	Machine Bolts	¾"x10"
40	" "	¾"x13"
80	Plate Washers	3"x3"x3/16"
4	Lag Screws	¾"x4"
4	Angles	3½"x5"x⅜"x1'-0"
2	"	3"x3"x⅜"x7⅛"

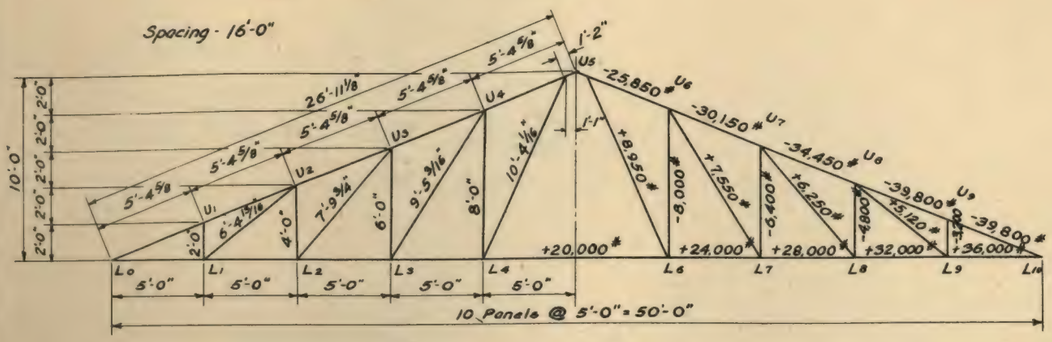
The proper camber may be introduced into this truss by raising the lower chord 1" at the center during fabrication.

LUMBER

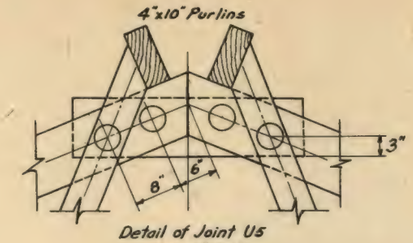
Lumber shall be of a structural grade with minimum allowable working stresses, in pounds per sq. in. as follows:
1200# Compression parallel to grain
1600# Extreme fiber in bending
1,600,000# Modulus of Elasticity
Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

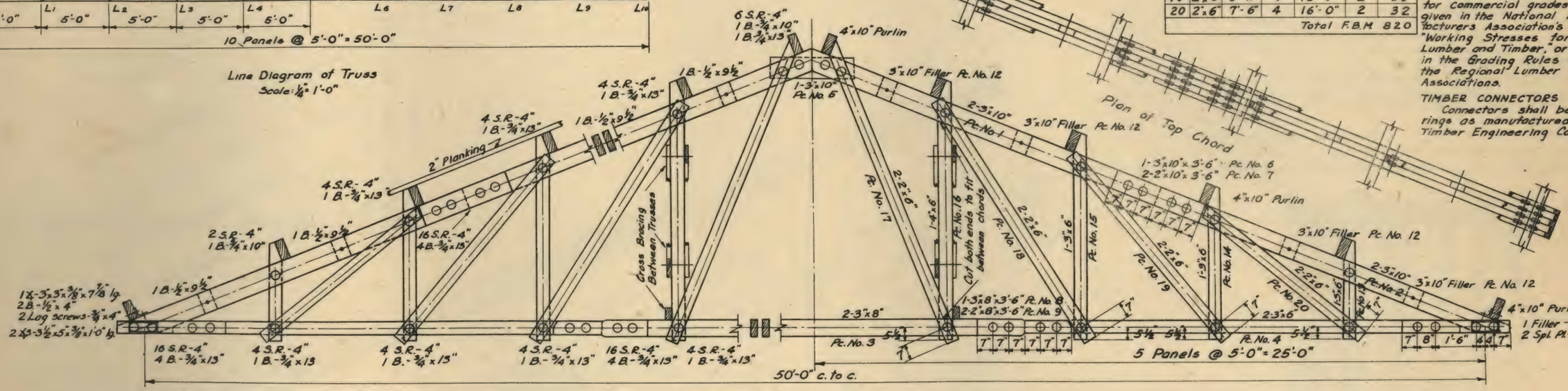
Connectors shall be TECO split rings as manufactured by the Timber Engineering Co., Wash., D. C.



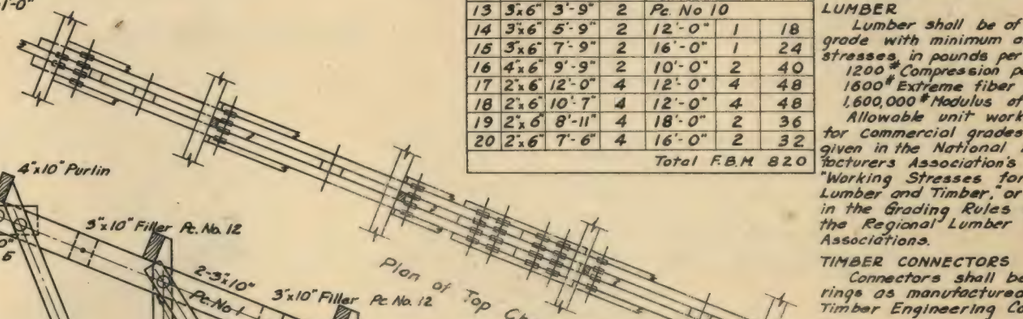
Line Diagram of Truss
Scale: ¼" = 1'-0"

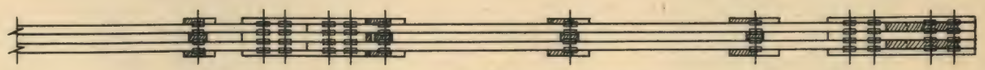


Detail of Joint U5
Scale: 1" = 1'-0"

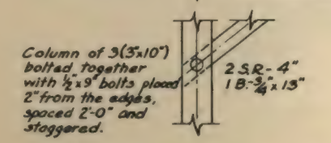


Elevation
Scale: ½" = 1'-0"
Scale in Feet

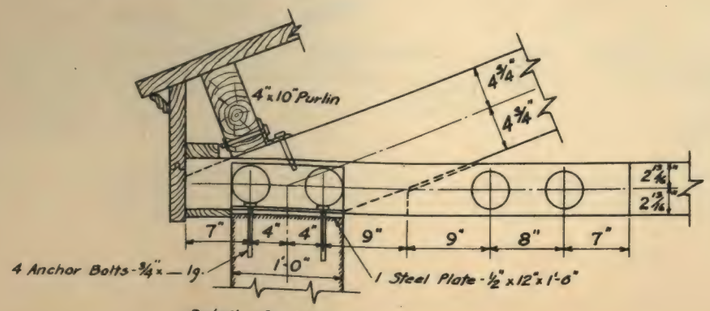




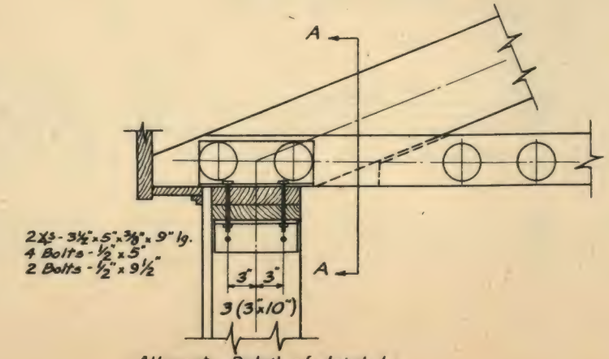
Plan of Bottom Chord



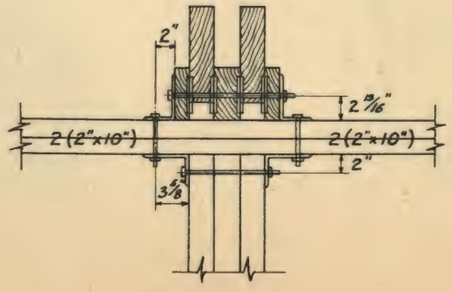
Wind Brace for Wood Column



Detail of Joint Lo
For Masonary Wall
Scale: 1½" = 1'-0"



Alternate Detail of Joint Lo
For Wood Column
Scale: 1½" = 1'-0"



Section A-A

Typical design for use of Engineers and Architects.

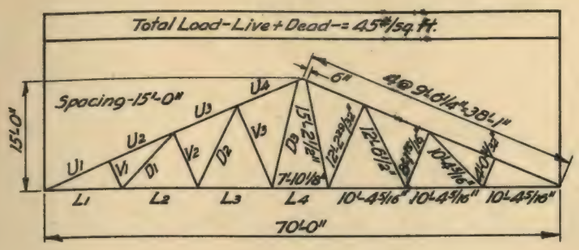
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

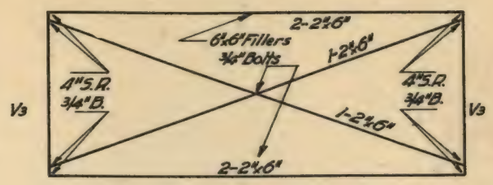
PRATT ROOF TRUSS
Span - 50'-0" Rise - 10'-0"

SCALE As Shown SHEET 1 OF 1

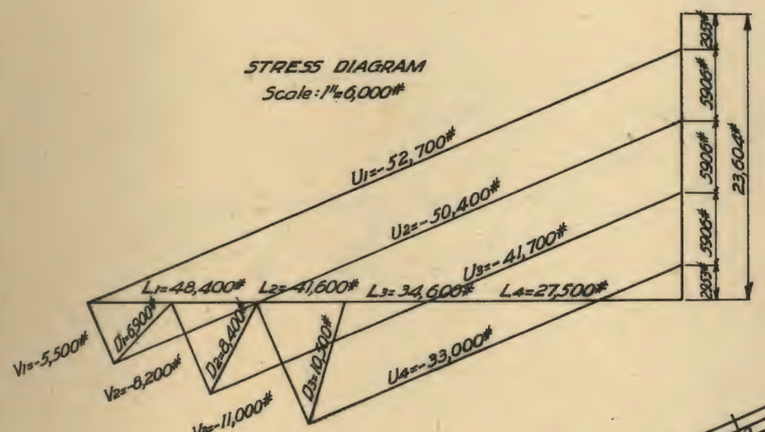
	DATE	DRAWING NO.
DESIGNED BY Kelly & Carr	11/26/36	123
CHECKED BY P. Landaam	3/24/37	
TRACED BY D.S. Harter	11/17/36	

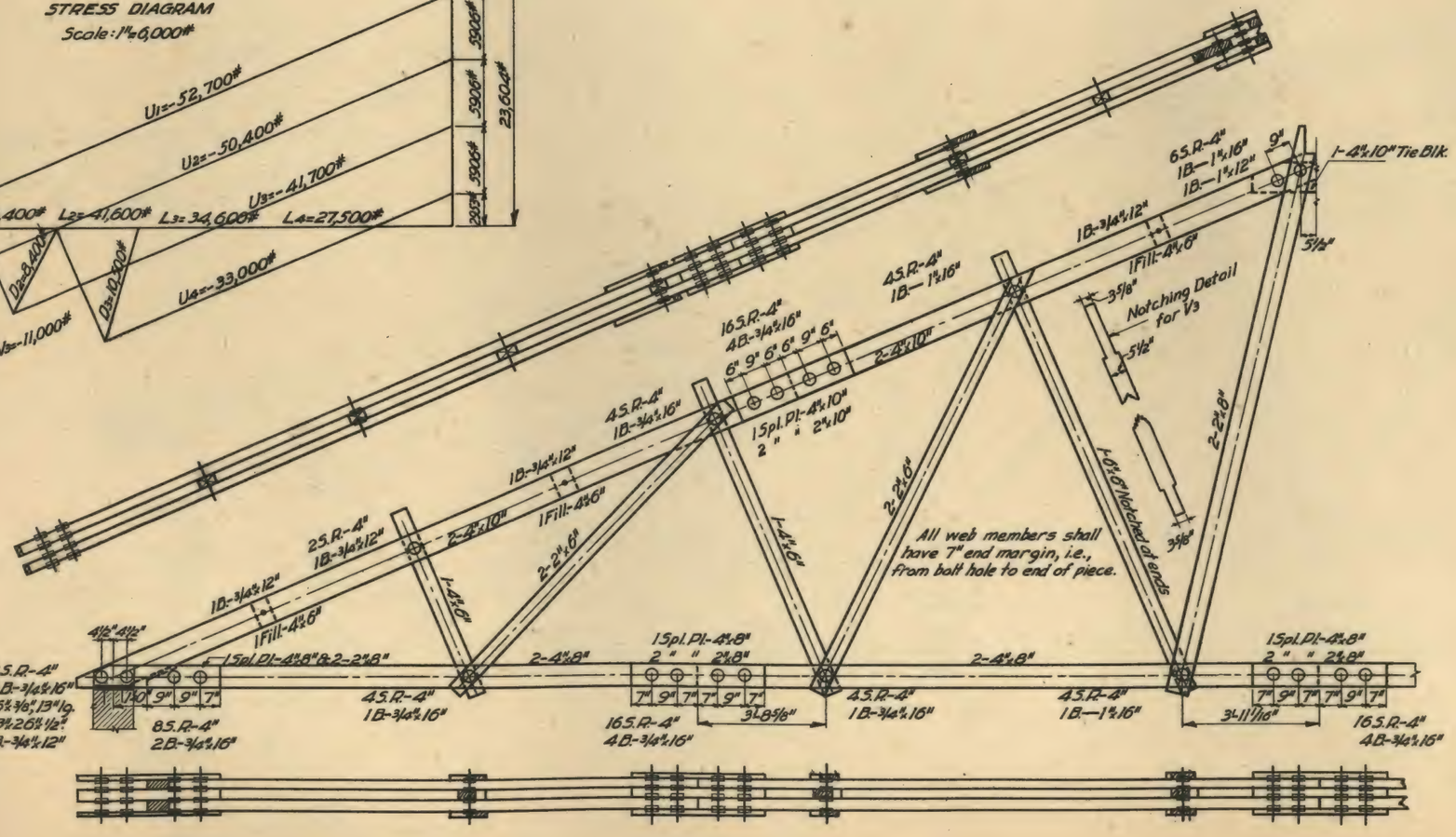
Rev. N.M. 10/27/39 J.H.C.





LATERAL BRACING DIAGRAM





NOTES:

ROOF

The top chord of this truss should not be subjected to bending. Purlins, 8"x10" should be placed at the panel points to rest beside the verticals extended. Two inch sheathing should then be applied to the purlins in a direction parallel to the long axis of the truss. Use 20' lengths with joints broken.

CAMBER

Camber may be provided in this truss by adding 1/16" to the length of each panel in the top chord. The panel point dimension will then be 9'-6 5/16" instead of 9'-6 1/4".

ADDITIONAL SPLICE

If 22' lengths are not available, the splice shown in panel U3 may be duplicated elsewhere.

LUMBER

Lumber shall be of a dense structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Co., Wash., D.C.

Lumber Cutting List-545-

Member	Size	Length	Make	Cut from	Order	Ft.B.M.
U1-U2	4"x10"	22'-7"	4	24'	4	320
U3-U4	4"x10"	16'-8"	4	18'	4	240
L1-L2	4"x8"	16'-0"	4	16'	4	171
L3-L4	4"x8"	18'-0"	4	18'	4	192
V1	4"x6"	5'-10"	2	16'	2	64
V2	4"x6"	9'-11"	2	See V1	0	0
V3	6"x6"	14'-0"	2	14'	2	84
D1	2"x6"	11'-7"	4	12'	4	48
D2	2"x6"	14'-0"	4	14'	4	56
D3	2"x8"	17'-0"	4	18'	4	96
Tie Blk.	4"x10"	4'-0"	1	12'	1	40
T.C.Spl.	4"x10"	3'-6"	2	See Tie Blk.	0	0
T.C.Spl.	2"x10"	3'-6"	4	14'	1	24
Spl.L2	4"x8"	3'-10"	2	20'	1	54
Spl.L2	2"x8"	3'-10"	4	16'	2	43
End Con.	4"x8"	4'-1"	2	See Spl.L2	0	0
End Con.	2"x8"	4'-1"	4	See " "	0	0
T.C.Fills	4"x6"	0'-9 1/2"	6	6'	1	12
Spl.L4	4"x8"	3'-10"	1	See Spl.L2	0	0
Spl.L4	2"x8"	3'-10"	2	8'	1	11
Truss Only - Total-1455 Ft.B.M.						

Hardware Truss Only.

No.	Item	Size
168	Teco Split Rings	4" φ
8	Machine Bolts	3/4"x12"
34	" "	3/4"x18"
2	" "	1"x12"
6	" "	1"x18"
16	Cut Washers	2" φ
76	Plate Washers	3"x3"x3/16"
4	Steel Angles	6"x6"x3/8", 13" lg.
2	Steel Plates	13"x26"x1/2"
8	Anchor Bolts	3/4"x12"

Typical design for use of Engineers and Architects.

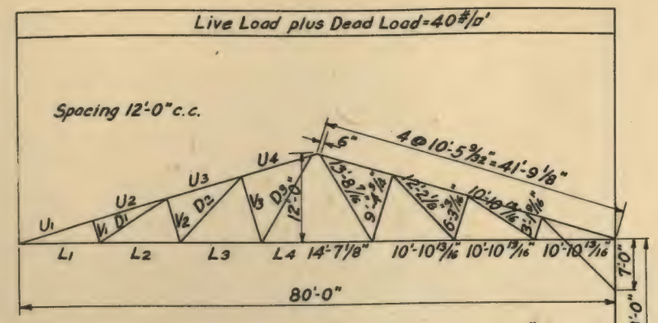
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

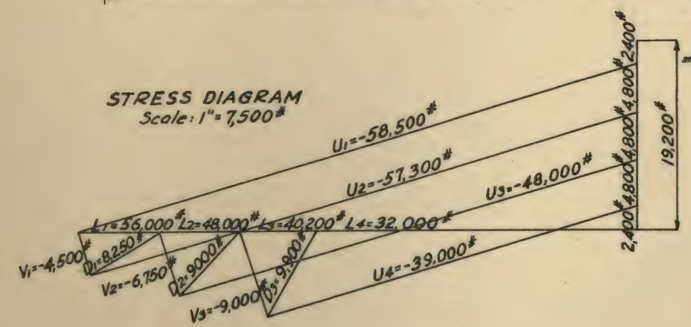
BELGIAN ROOF TRUSS
SPAN-70'-0" RISE-15'-0"

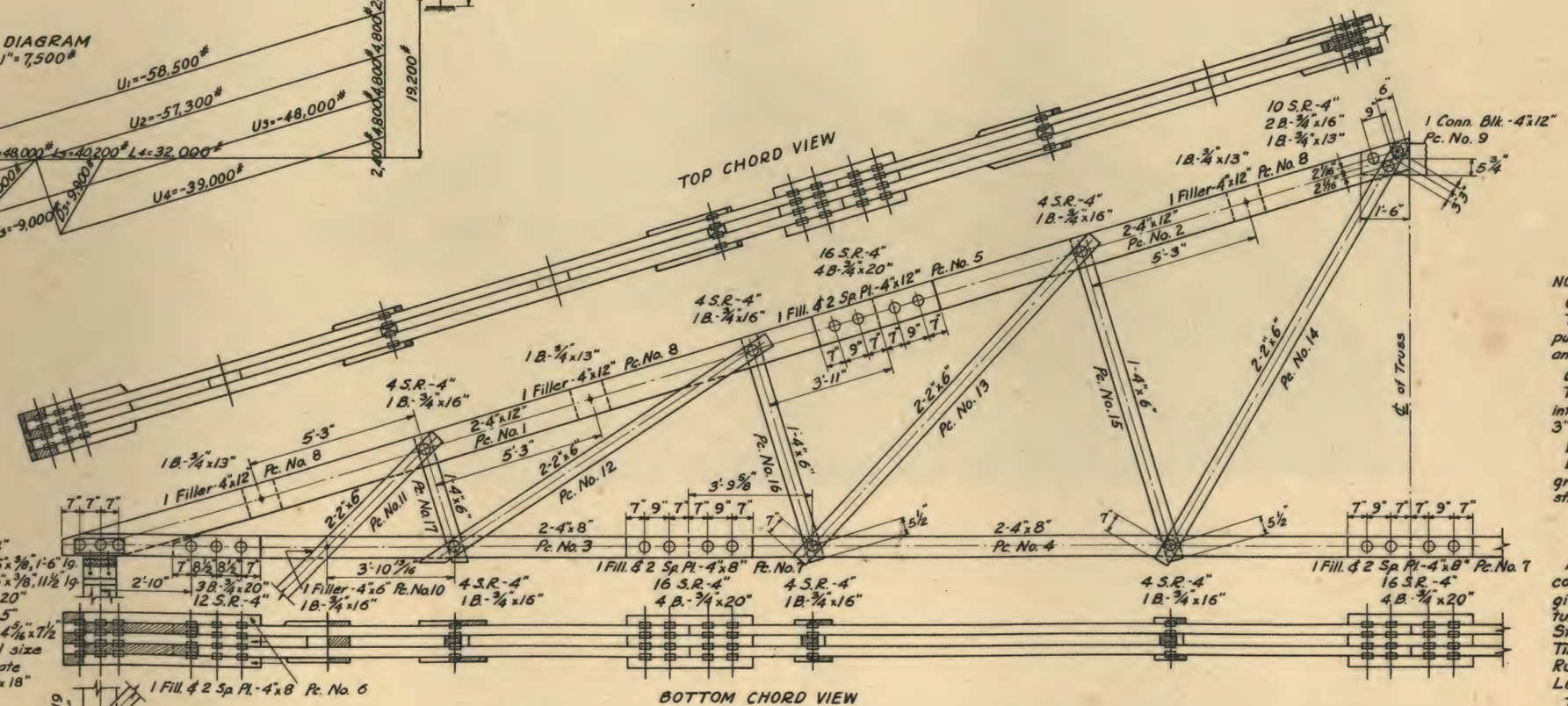
SCALE 1/2"=1'-0" SHEET 1 OF 1

		DATE	DRAWING NO.
DESIGNED BY	J.H.CARR	5/24/30	247
CHECKED BY	F.R.C.		
TRACED BY	W.ADAM	5/31/30	

Rev. N.M.- 2/15/40, J.H.C.







ELEVATION-80FT. BELGIAN TYPE TRUSS

Scale: 1/2" = 1'-0"

0 1 2 3 4 5
Scale in Feet

MATERIALS LIST PER TRUSS						
LUMBER CUTTING BILL (S4S)						
Mk.	Size	Length	Make	Cut From	Order	F.B.M.
1	4"x12"	26'-0"	4	26'-0"	4	416
2	4"x12"	17'-1"	4	18'-0"	4	288
3	4"x8"	15'-9"	4	16'-0"	4	171
4	4"x8"	22'-0"	4	22'-0"	4	235
5	4"x12"	3'-10"	6	12'-0"	2	96
6	4"x8"	6'-0"	6	18'-0"	2	96
7	4"x8"	3'-10"	9	20'-0" / 18'-0"	1	96
8	4"x12"	1'-0"	6	10'-0"	1	40
9	4"x12"	3'-0"	1	Pc. No. 8		
10	4"x6"	1'-5"	2	12'-0"	1	24
11	2"x6"	15'-8"	4	16'-0"	4	64
12	2"x6"	12'-8"	4	14'-0"	4	56
13	2"x6"	13'-5"	4	14'-0"	4	56
14	2"x6"	15'-1"	4	16'-0"	4	64
15	4"x6"	10'-4"	2	18'-0"	2	72
16	4"x6"	7'-3"	2	Pc. No. 15		
17	4"x6"	4'-3"	2	Pc. No. 10		
18	6"x8"	0'-11 1/2"	4	4'-0"	1	16
19	10"x12"	18'-0"	2	18'-0"	2	360
Total F.B.M. 2150						

HARDWARE		
No.	Item	Size
200	Split Rings	4" ϕ
16	Claw Plates	3 1/8 ϕ
8	Machine Bolts	1/2"x12"
8	" "	3/4"x5"
8	" "	3/4"x13"
20	" "	3/4"x16"
36	" "	3/4"x20"
16	Cut Washers	2" ϕ
108	Plate Washers	3"x3"x3/16"
4	Angles	4"x6"x3/8", 11 1/2 lg.
4	"	4"x6"x3/8", 1'-6 lg.
4	" welded to	4"x7"x3/8", 11 1/2 lg.
4	Steel Plates	11 1/2"x12"x3/8"
8	Anchor Bolts	3/4"x — lg.
2	Base Plates	11 1/2"x18"x3/8"

NOTES:

GENERAL

This design shall be used with 3"x12" purlins placed directly over panel points and 2" roofing placed on purlins.

CAMBER

The proper camber may be introduced into this truss by raising the lower chord 3" at the center during fabrication.

LUMBER

Lumber shall be of a dense structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1200# Extreme fiber in bending
1,600,000# Modulus of elasticity

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings and claw plates as manufactured by the Timber Engineering Company, Washington, D. C.

Typical design for use of Engineers and Architects

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

ROOF TRUSS-BELGIAN
Span-80'-0" Rise-12'-0"

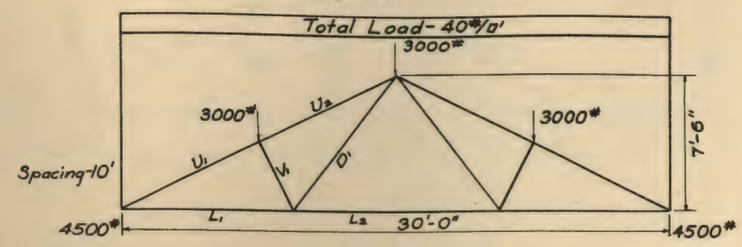
SCALE 1/2" = 1'-0" SHEET 1 OF 1

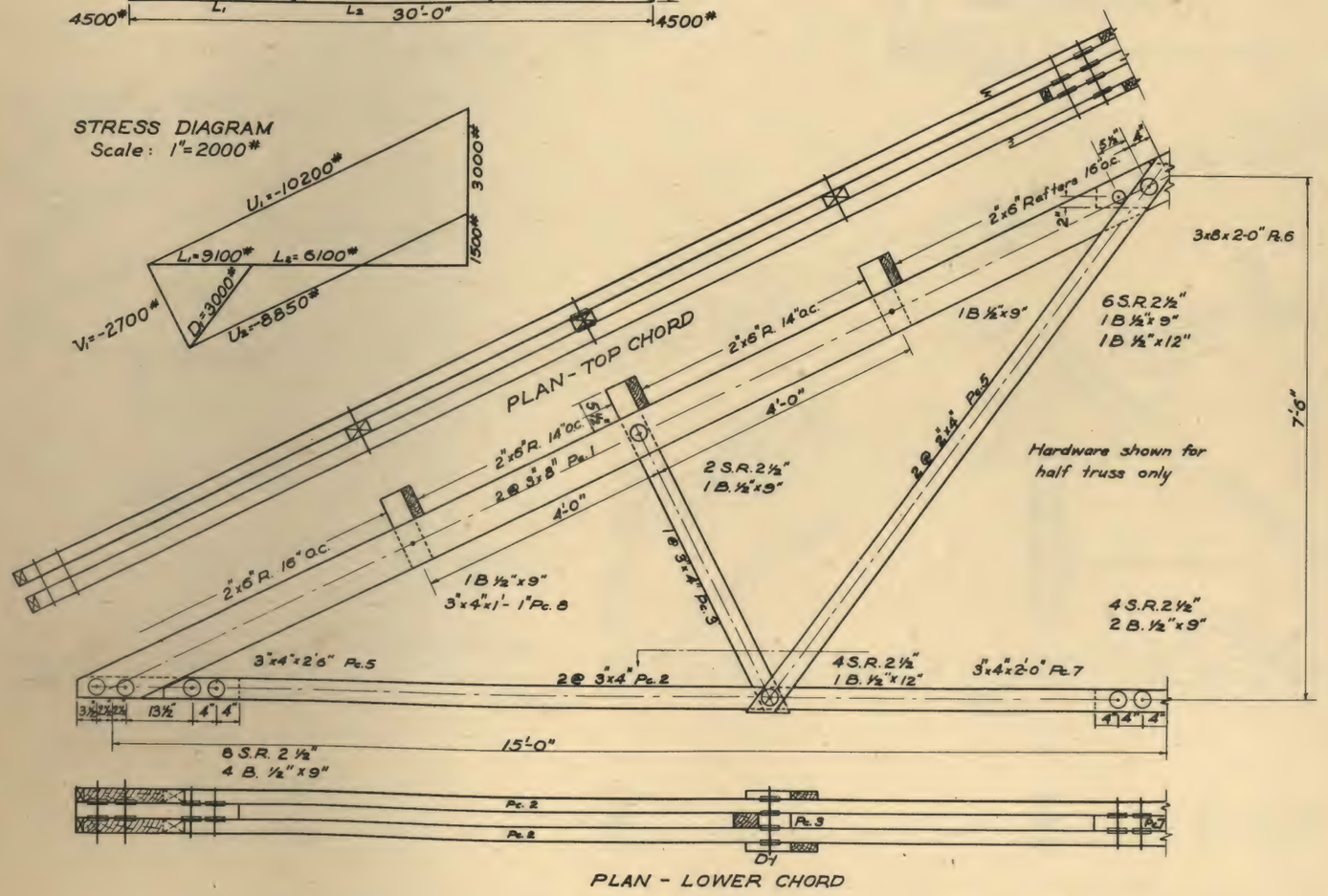
	DATE	DRAWING NO.
DESIGNED BY J.N. Corr	1/5/39	185
CHECKED BY P. Landsem	2/9/39	
TRACED BY O.S. Harter	12/1/39	

Rev. N.H. 10/30/39 J.N.C.

MARKET ROOFS

USES: Market roofs are used for the purpose of providing shelter for produce and materials during unloading, storage and loading activities. They consist primarily of wall-less shelters providing protection against precipitation and the sun. Designs of this type may provide central spans up to fifty feet with overhangs up to twenty feet on each side.





30'-0" PARK SHELTER TRUSS

SCALE: 1" = 1'-0"

0 1 2 3 4

SCALE IN FEET

NOTES:

GENERAL

This truss has been designed to carry rafters on the top chord as shown. Spiking to top chord or to extensions of web members as shown will be sufficient fastening.

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the leaflet, "Working Stresses for Structural Timber," or are available from the Regional Lumber Manufacturers Association.

TIMBER CONNECTORS

Connectors shall be TECO split rings and toothed rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIAL LIST PER TRUSS

LUMBER CUTTING BILL (S4S)

Mk.	Size	Length	Make	Cut From	Order	F.B.M.
1	3 x 8	17'-6"	4	18'-0"	4	144
2	3 x 4	15'-6"	4	16'-0"	4	64
3	3 x 4	5'-3"	2	18'-0"	1	18
4	2 x 4	9'-10"	4	10'-0"	4	27
5	3 x 4	2'-6"	2	Pc. No. 5		
6	3 x 8	2'-0"	1	2'-0"	1	4
7	3 x 4	2'-0"	1	Pc. No. 3		
8	3 x 4	1'-1"	4	Pc. No. 7		
				Total F.B.M. 257		

CONNECTORS

No.	Item	Size
56	Split Ring	2½"

HARDWARE

No.	Item	Size
20	Machine Bolts	½" x 9"
4	" "	½" x 12"
48	Plate Washers	2"x2"x⅛"

Typical Design for use of Engineers and Architects

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

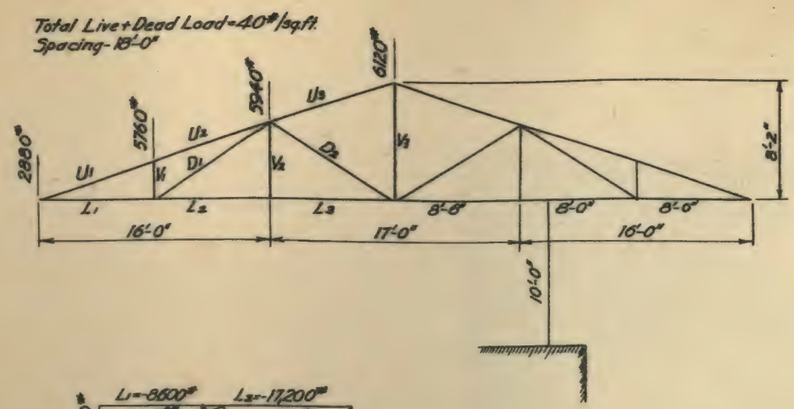
PARK SHELTER TRUSS

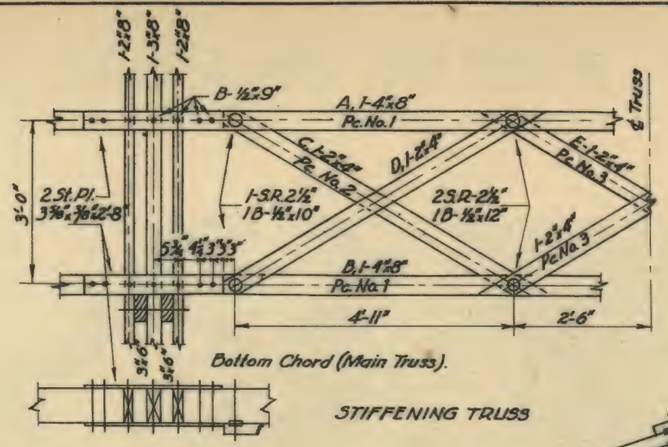
SPAN: 30'-0" RISE: 7'-6"

SCALE 1" = 1'-0" SHEET 1 OF 1

		DATE	DRAWING NO.
DESIGNED BY	F.R.C.	5/4/38	263
CHECKED BY	N.M.P.	11/14/41	
TRACED BY	M.L.	11/21/41	

O.K. N.M. A.G.D. 11/22/41





NOTES:

This truss has been designed for 4"x12" purlins as shown and 1½" roof decking running at right angles to the purlins.

LUMBER-

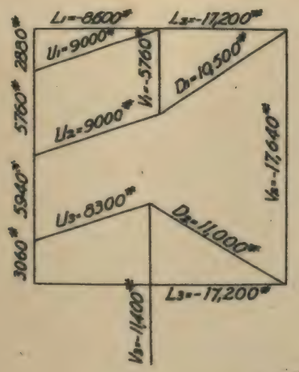
Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq in as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

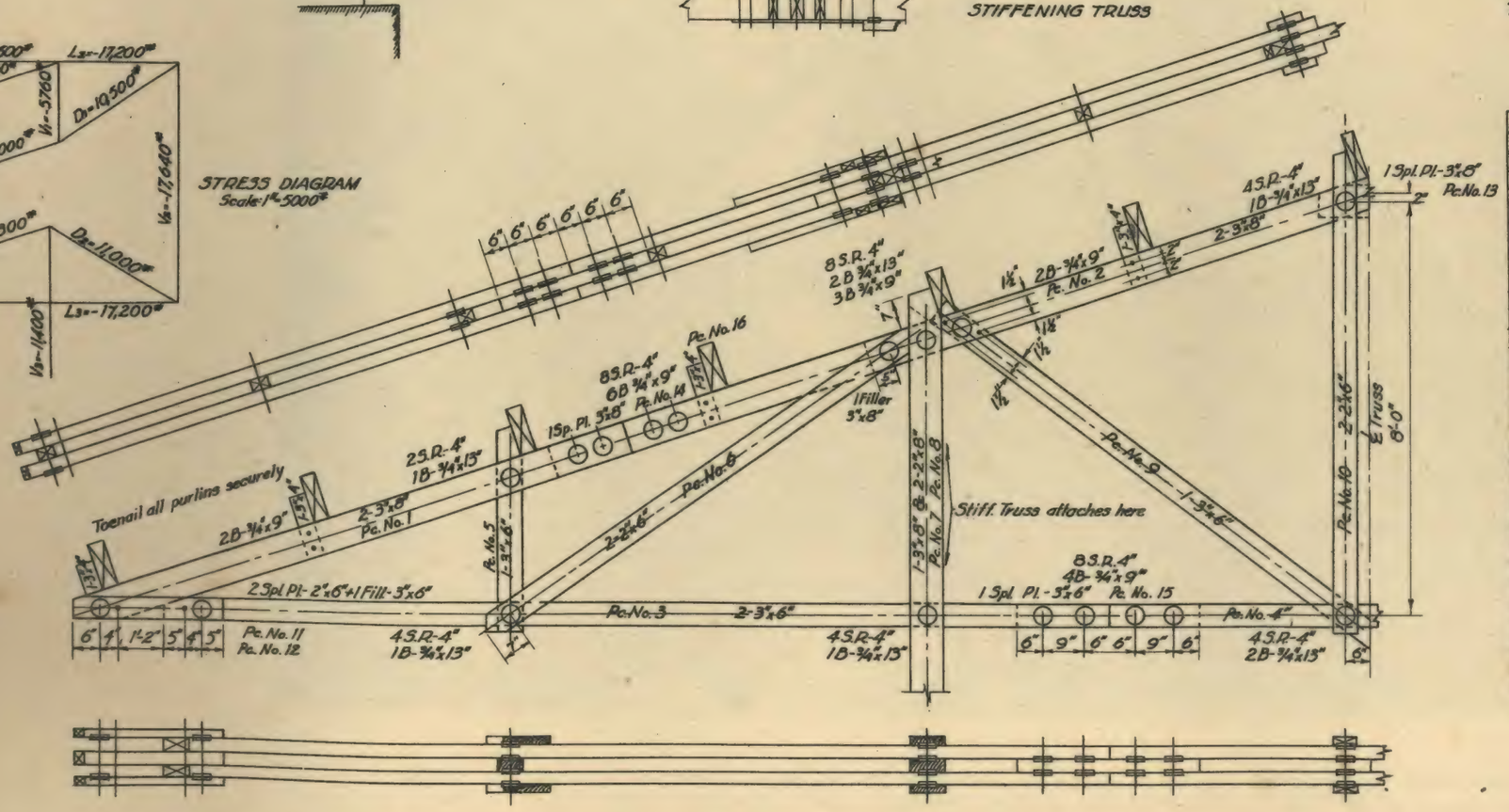
Allowable unit working stresses for commercial grades of lumber are given in the leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS-

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D. C.



STRESS DIAGRAM
Scale: 1"=5000#



MATERIALS LIST PER TRUSS														
LUMBER CUTTING BILL														
Mk.	Size	Length	Make	Cut From	Order	F.B.M.	Mk.	Size	Length	Make	Cut From	Order	F.B.M.	
1	3"x8"	11'-4"	4	12'-0"	4	96	9	3"x6"	10'-6½"	2	Pc. No. 5			
2	3"x8"	15'-1½"	4	16'-0"	4	128	10	2"x6"	9'-4"	4	Pc. No. 6			
3	3"x6"	18'-0"	4	18'-0"	4	108	11	3"x6"	2'-11"	2	12'-0"	1	18	
4	3"x6"	10'-6"	2	12'-0"	2	36	12	2"x6"	2'-11"	4	12'-0"	1	12	
5	3"x6"	4'-0"	2	16'-0"	2	48	13	3"x8"	2'-0"	1	8'-0"	1	16	
6	2"x6"	10'-0"	4	20'-0"	4	80	14	3"x8"	3'-0"	2	Pc. No. 13			
7	3"x8"	15'-11"	2	16'-0"	2	64	15	3"x6"	3'-8"	2	Pc. No. 11			
8	2"x8"	16'-4"	4	18'-0"	4	96	16	3"x4"	1'-3"	8	10'-0"	1	10	
Total F.B.M. 712														
Stiffening Truss														
1	4"x8"	16'-8"	2	18'-0"	2	96	3	2"x4"	7'-0"	2	14'-0"	1	9.3	
2	2"x4"	6'-9"	4	14'-0"	2	18.7								
Total F.B.M. 124														

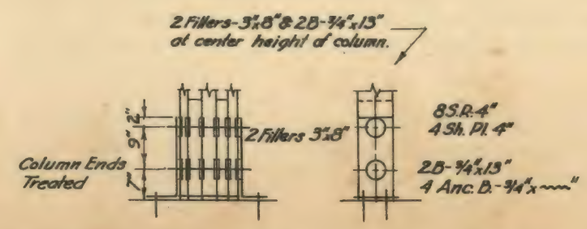
CONNECTORS					
No.	Item	Size	No.	Item	Size
92	Split Rings	4" ϕ			
For Stiffener Truss and Column					
12	Split Rings	2½" ϕ	8	Shear Plates	4" ϕ
8	" "	4" ϕ			

HARDWARE					
No.	Item	Size	No.	Item	Size
34	Machine Bolts	¾"x9"	116	Plate Washers	3"x3"x 3/16"
24	" "	¾"x13"			
For Stiffener Truss and Column					
14	Machine Bolts	½"x9"	16	Plate Washers	2"x2"x 1/8"
4	" "	½"x10"	4	Angles	3/8"x4"x17'-7 1/16"
4	" "	½"x12"	4	Steel Plates	3/8"x3/8"x2'-6"
2	" "	¾"x13"	4	Anc. Bolts	¾"x—"

49 FOOT MARKET SHELTER

Scale: ¾"-1'-0"

0 1 2 3
Scale in Feet



Typical design for use of Architects and Engineers.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

MARKET SHELTER
SPAN-49'-0" RISE-8'-2"

SCALE ¾"=1'-0" SHEET 1 OF 1

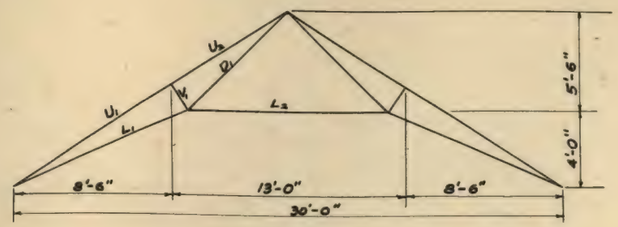
		DATE	DRAWING NO.
DESIGNED BY	J. CARR	2/14/27	78
CHECKED BY	F.P.C.	2/4/27	
TRACED BY	A.J.G.	10/14/11	

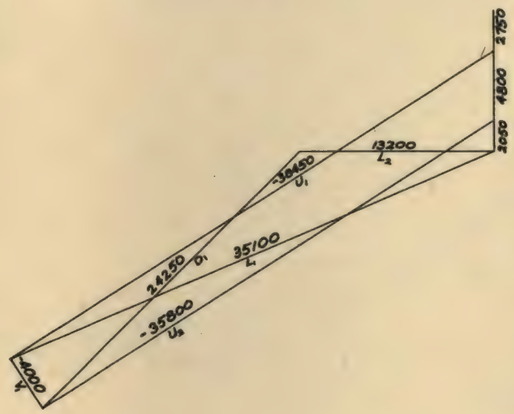
O.K.-N.M.-A.G.D. 10/15/11

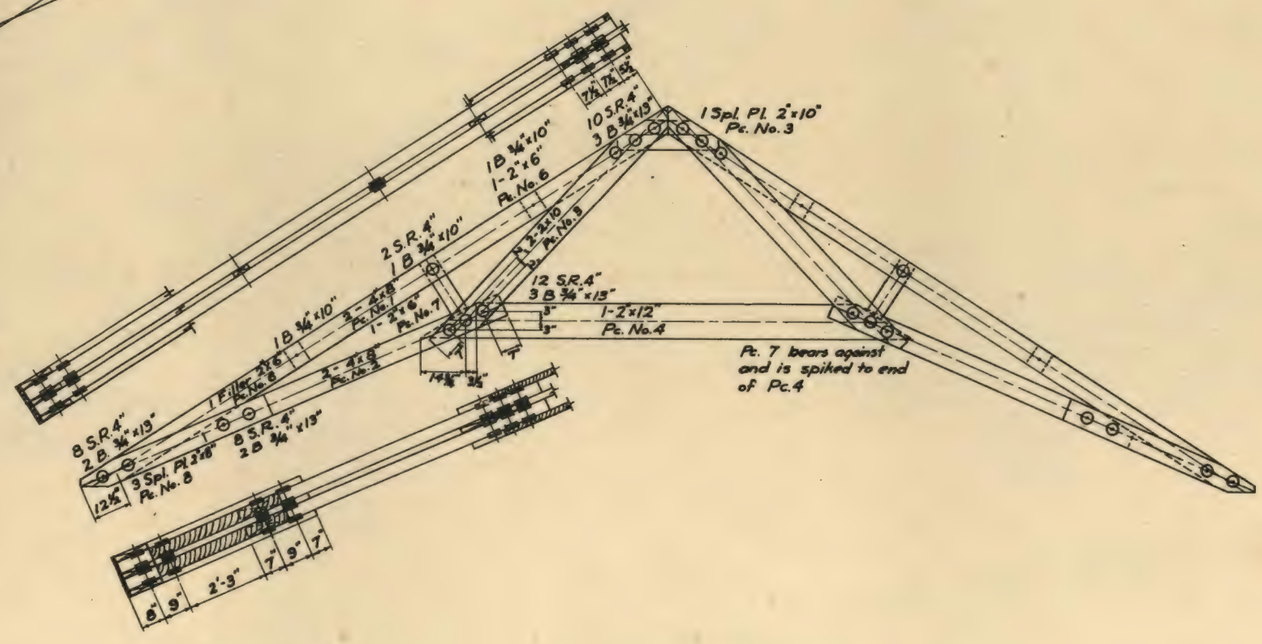
SCISSORS TRUSSES

USES: Scissors trusses can be effectively designed and constructed for spans up to eighty feet. They are primarily employed in church structures. For this purpose scissors trusses provide proper support for the roof structure at a reasonable cost. More important, however, are the architectural results obtained. The trusses in themselves provide a pleasing appearance and in addition the arch effect obtained is excellent for church interiors.

Modifications of this type of truss may be adopted where it is desirable to have a greater clear height at the center of the span than at the sides. Gymnasiums, meeting halls and buildings of that nature often employ the raised truss of this type.







30'-0" RAISED LOWER CHORD
FINK TRUSS
Scale: ½"=1'-0"

0 1 2 3 4
Scale in Feet

NOTES:

GENERAL

This truss has been designed for loads at top chord panel points only. Purlins 4"x10" will be satisfactory.

LUMBER SPECIFICATIONS

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

880# Compression parallel to grain
1,200# Extreme fiber in bending
1,600,000# Modulus of elasticity

Allowable unit working stresses for commercial grades are given in the leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington D.C.

MATERIALS LIST PER TRUSS

LUMBER CUTTING BILL

Mk	Size	Length	Make	Cut From	Order	F.B.M.
1	4x8	19'-1½"	4	20'-0"	4	214
2	4x8	11'-10"	4	24'-0"	2	128
3	2x10	9'-0"	4	18'-0"	2	60
4	2x12	13'-6"	1	14'-0"	1	28
5	2x10	2'-9"	1	4'-0"	1	7
6	2x6	0'-7½"	4	6'-0"	1	6
7	2x6	1'-9"	2	Pc. No. 6		
8	2x8	5'-7"	6	18'-0"	2	48
					Total	491

CONNECTORS

No.	Item	Size
80	4" Split Rings	4"

HARDWARE

No.	Item	Size
20	Machine Bolts	¾" x 14"
6	" "	¾" x 10"
52	Plate Washers	3"x 3" x 3/16"

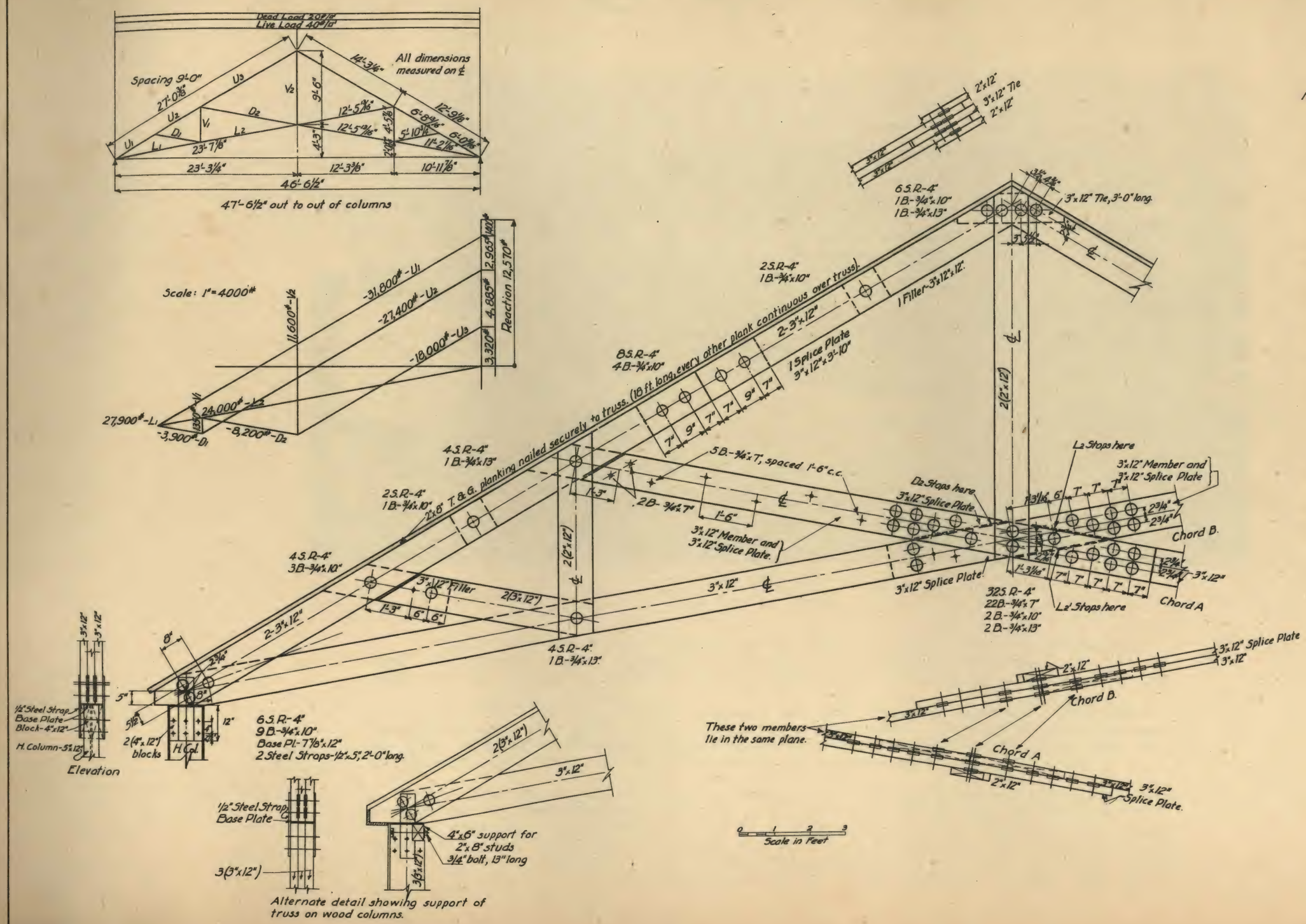
Typical design for use of Engineers and Architects

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.
RAISED LOWER CHORD
FINK TRUSS
Span = 30'-0" Rise = 9'-6"

SCALE ½"=1'-0" SHEET 1 OF 1

		DATE	DRAWING NO.
DESIGNED BY	J.H.C.	12/12/38	269
CHECKED BY			
TRACED BY	M.L.	11/29/41	

REVISED M.M. W.B.M 11/23/41



NOTES:

LUMBER SPECIFICATIONS.

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

1200# Compression parallel to grain.
1600# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades are given in the attached N. L. M. A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

SPLIT RING CONNECTORS.

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST

Lumber per truss (S4S)

4 Pieces	2"x12"-12'-0"	96 Ft. B.M.
2 "	3"x12"x28'-0"	168 "
6 "	3"x12"x12'-0"	216 "
8 "	3"x12"x18'-0"	432 "
	Total	912 Ft. B.M.

Hardware per truss.

104 Split Rings - 4" ϕ
36 Machine Bolts - ¾"x7"
28 " " ¾"x10"
8 " " ¾"x13"
136 Plate Washers - 3"x3"x3/16"

Hardware required for attaching truss to columns not listed.

Typical design for use of Engineers and Architects.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

SCISSORS ROOF TRUSS
Span 46'-6" Rise 13'-9"

SCALE ¾" = 1'-0" SHEET 1 OF 1

TRACED BY W. ADAM DATE 1/30/37
DESIGNED BY P. LANDSEM 12/5/36
CHECKED BY J. CARR 1/26/37

DRAWING NO. 206

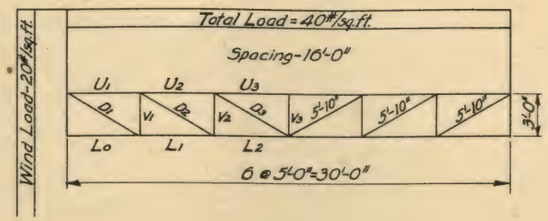
Rev. N.M. 10/27/39-J.H.C.

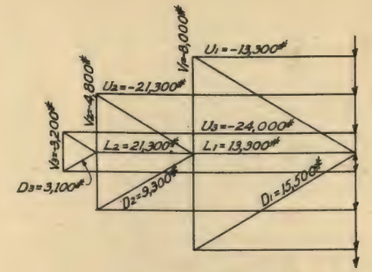
FLAT PRATT TRUSSES

USES: Flat Pratt roof trusses can be used for clear spans up to one hundred twenty feet. Spans in excess of eighty feet, however, generally are not as efficient in economy or fabrication and bowstring trusses might better be used.

The Pratt type is used in place of the Howe in order that the compression members in the web system may be as short as possible. TECO connectors, because of their ability to develop tension connections, are largely responsible for the adoption of this type and the elimination of steel rods.

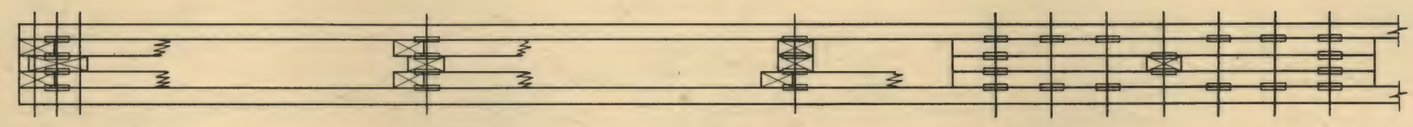
The framing method by which the chords are placed on the outside of the truss rather than between diagonals and verticals has been chosen and is advisable for several reasons. The primary reason is that stresses in the diagonals are transmitted directly to the verticals and chords and at an angle of approximately forty-five degrees in each case. This eliminates transference of vertical loads through the chords and a ninety degree intersection at lower connector loads. Appearance is an added factor.

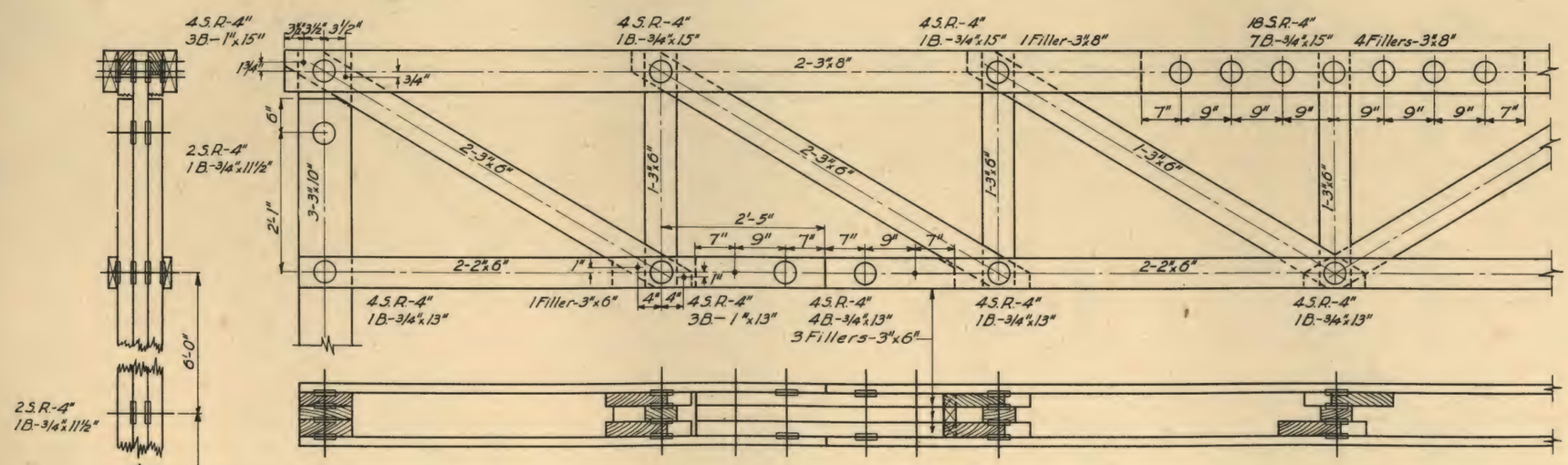




STRESS DIAGRAM
Scale: 1" = 6,000#

TOP CHORD VIEW





BOTTOM CHORD VIEW

2 S.R.-4"
3B-¾"x11½"
2 ⅛"-6"x4"x3/8", 6" long.
4 Lag screws-¾"x— long.

30 FT FLAT TOP PRATT ROOF TRUSS
Scale: 1" = 1'-0"

NOTES:

GENERAL
The roofing for this truss shall consist of 3"x12" purlins at the panel points with 2" sheathing.

LUMBER
Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:
880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.
Allowable unit working stresses for commercial grades of lumber are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Association.

TIMBER CONNECTORS.
Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST PER TRUSS

LUMBER (S4S)

4	Pieces	2"x6"x16'-0"	64 Ft.B.M.
2	"	3"x6"x12'-0"	36 "
5	"	3"x6"x14'-0"	105 "
6	"	3"x10"x16'-0"	240 "
1	"	3"x6"x18'-0"	27 "
1	"	3"x8"x18'-0"	36 "
4	"	3"x8"x16'-0"	128 "
		Total —	636 Ft.B.M.

HARDWARE

78 Teco Split Rings	4" ϕ
10 Machine Bolts	¾"x11½"
13 " "	¾"x13"
11 " "	¾"x15"
4 Angles	6"x4"x3/8", 6" long
8 Lag Screws	¾"x—
56 Plate Washers	3"x3"x3/16" (Punched- 13/16" Hole)
6 Machine Bolts	1"x13"
6 " "	1"x15"
24 Plate Washers	3"x3"x3/16" (Punched- 1 1/16" Hole

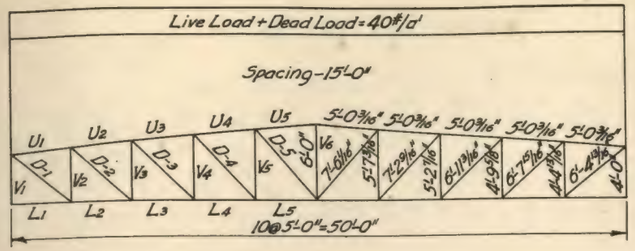
Typical design for use of Engineers and Architects.

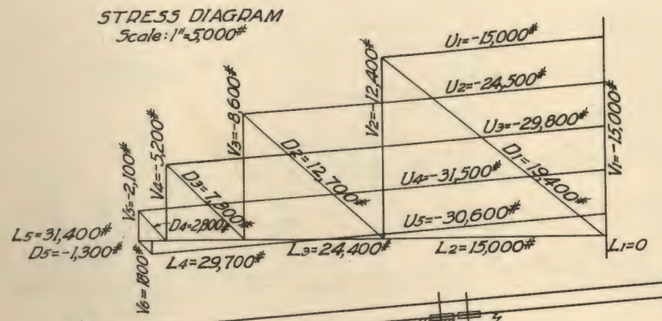
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

FLAT TOP PRATT
SPAN-30'-0" HEIGHT-3'-0"

SCALE 1" = 1'-0" SHEET 1 OF 1
TRACED BY W. ADAM DATE 2/24/97
DESIGNED BY J. CARR 3/4/97
CHECKED BY F.J.H. 6/21/97
DRAWING NO. 31

Rev. N.M.-10/27/39-J.H.C.





Lumber Cutting Bill - Per Truss													
Pc. Mk.	Size	Length	Make	Cut from	Order	Ft. B.M.	Pc. Mk.	Size	Length	Make	Cut from	Order	Ft. B.M.
U1-U5	3"x10"	14'-0"	4	14'-0"	4	140	D2	3"x6"	7'-10⅛"	4	16'-0"	2	48
U2-U5	3"x10"	12'-0"	4	12'-0"	4	120	D3	3"x6"	8'-0"	4	16'-0"	2	48
L1-L4	2"x10"	17'-5"	4	18'-0"	4	120	D4	3"x6"	8'-0"	4	16'-0"	2	48
L4-L4	2"x10"	18'-0"	2	18'-0"	2	54	D5	3"x4"	8'-4"	2	18'-0"	1	18
V1	3"x10"	4'-10"	2	A-12'-0"	2	60	S-1	3"x10"	3'-0"	6	12'-0"	3	90
V2	3"x10"	5'-2½"	2	See V-B	0	0	S-2	3"x10"	4'-8"	2	See V-A	0	0
V3	3"x6"	5'-7"	2	12'-0"	1	18	S-3	3"x10"	3'-0"	6	See S1	0	0
V4	3"x6"	6'-0"	2	12'-0"	1	18	F-1	3"x10"	2'-2"	2	See V-A	0	0
V5	3"x4"	6'-4½"	2	14'-0"	1	14	F-2	3"x4"	0'-10"	2	See V-B & D1	0	0
V6	3"x4"	6'-9½"	1	8'-0"	1	8	V-1	3"x10"	4'-4½"	4	8'-14'-0"	2	70
D1	3"x6"	8'-0"	4	16'-0"	2	48	S-4	2"x10"	3'-0"	8	12'-0"	2	40
Lumber Footage - 962 Ft. B.M.													

Hardware					
No.	Item	Size	No.	Item	Size
168	Split Rings	4"	1	Machine Bolt	1"x13"
2	Machine Bolts	¾"x10"	4	Angles - 4"x6"x⅜", 4" long	
14	" "	¾"x13"	2	Steel Plates	10"x21"x¼"
24	" "	¾"x15"	4	Anchor Bolts	¾"x13"
110	Plate Washers	3"x3"x⅜"	8	Machine Bolts	¾"x18"
			8	" "	¾"x16"

NOTES:

GENERAL

This truss has been designed for a roofing system consisting of 4"x10" purlins lapped directly over the panel points and 2" roof sheathing applied directly to these purlins. Purlins should be attached to the top chord of the truss either with clip angles or by extending the verticals and nailing to them.

Except in buildings with walls designed for prospective wind pressures, end and side bays shall be horizontally braced at the level of the lower chord.

LUMBER-

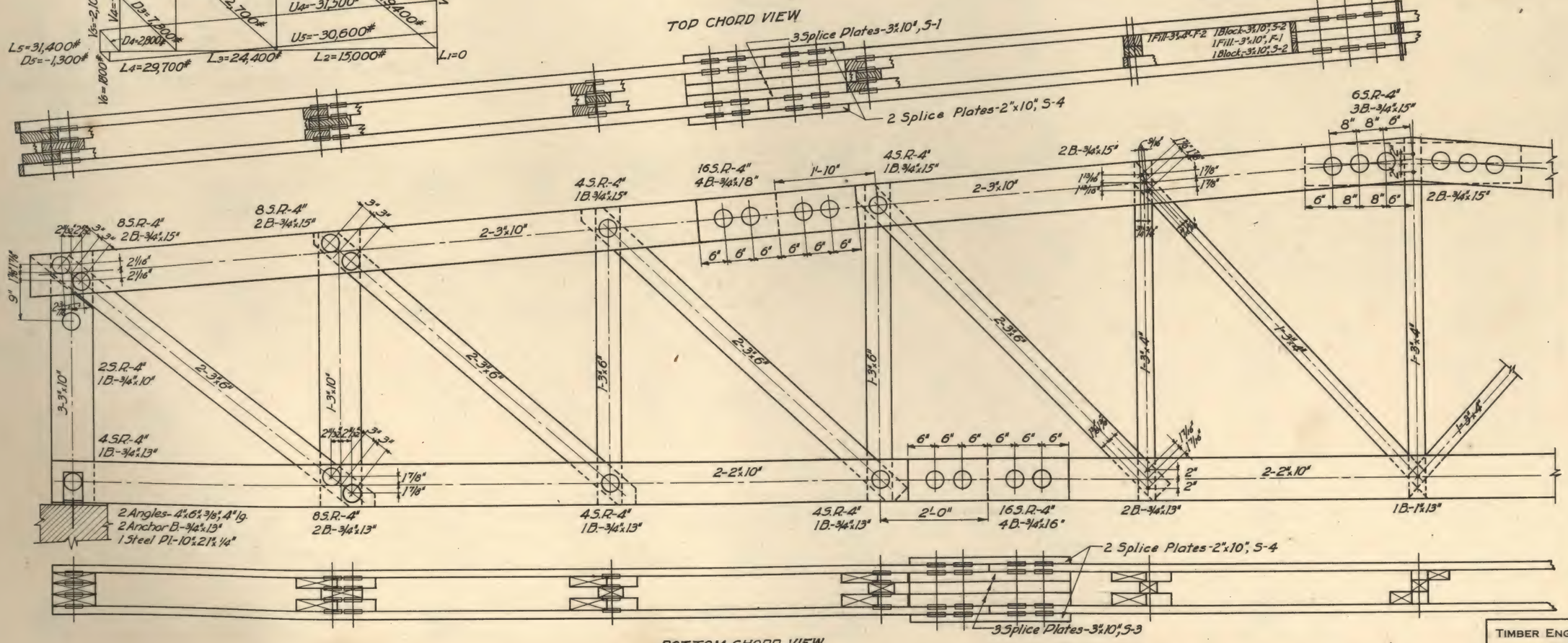
Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the N.L.M.A. leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.



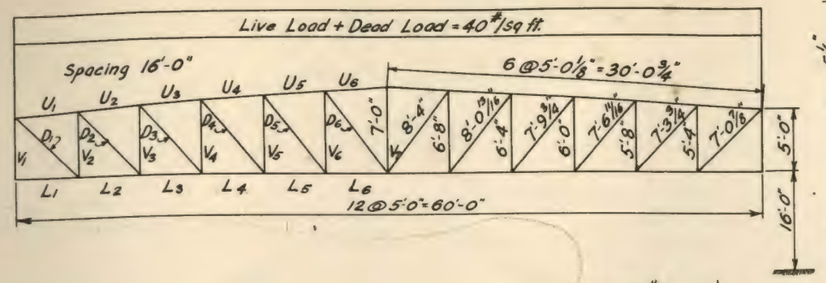
50 FT. FLAT TOP PRATT ROOF TRUSS

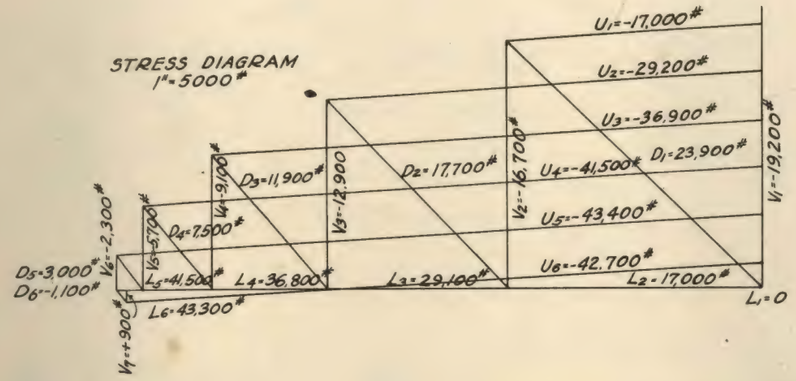
Scale: 1" = 1'-0"

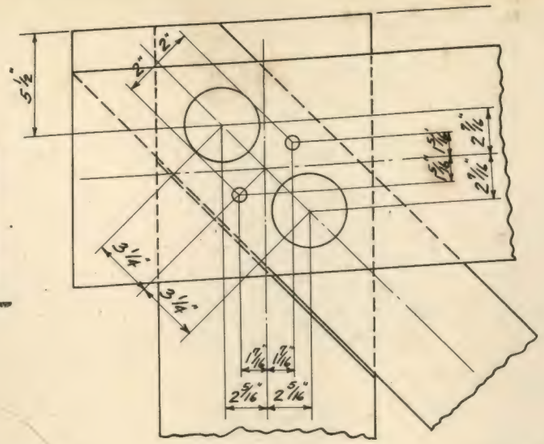
Typical design for use of Architects and Engineers

TIMBER ENGINEERING COMPANY WASHINGTON, D. C.	
FLAT PRATT TRUSS SPAN-50'-0" DEPTH-6'-0" SPACING-15'-0"	
SCALE 1"=1'-0" SHEET 1 OF 1	
DESIGNED BY J. CARR 4/21/37 CHECKED BY F.P.C. 11/15/37 TRACED BY W. ADAM 12/24/37	DRAWING No. 221

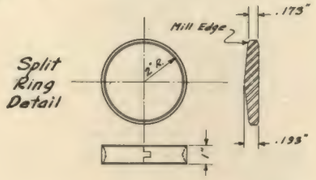
Rev. N.M. 11/28/40 D.S.H.

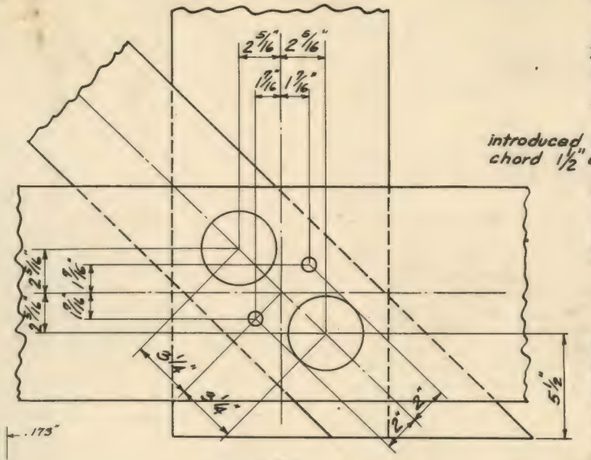






JOINT "A"
Scale: 3" = 1'-0"





JOINT "B"
Scale: 3" = 1'-0"

NOTES:

GENERAL

This truss is to be used with purlins at panel points only. Purlins 5"x10," covered with a 2" plank roofing is a satisfactory solution.

CAMBER

The proper camber may be introduced into this truss by raising the lower chord 1 1/2" at the center during fabrication.

LUMBER

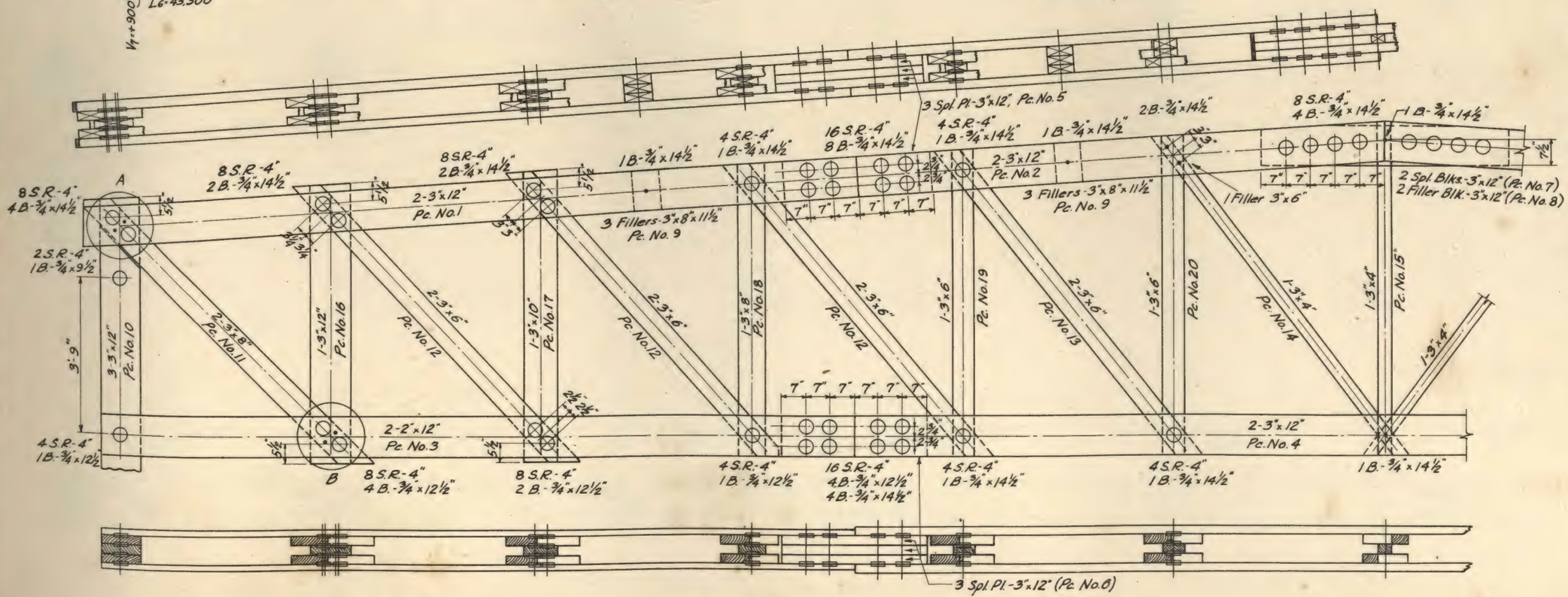
Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq in. as follows:

880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of Elasticity

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.



60 FT. FLAT TOP PRATT TRUSS
Scale: 3/4" = 1'-0"
0 1 2 3
Scale in Feet

Typical design for use of Engineers and Architects

MATERIALS LIST PER TRUSS						
LUMBER CUTTING BILL (S4S)						
Mk.	Size	Length	Make	Cut From	Order	F.B.M.
1	3"x12"	18'-5"	4	20'-0"	4	240
2	3"x12"	12'-6"	4	14'-0"	4	168
3	2"x12"	17'-10"	4	18'-0"	4	144
4	3"x12"	25'-0"	2	26'-0"	2	156
5	3"x12"	3'-6"	6	14'-0"	3	126
6	3"x12"	3'-6"	6			
7	3"x12"	5'-10"	2	18'-0"	1	54
8	3"x12"	2-9 1/4"	2			
9	3"x8"	0'-11 1/2"	12	Pc's No. 1 & 2		
10	3"x12"	21'-8"	6	22'-0"	6	396
11	3"x8"	9'-4"	4	20'-0"	2	80
12	3"x6"	9'-6"	12	20'-0"	6	180
13	3"x6"	9'-6"	4	20'-0"	2	60
14	3"x4"	9'-8"	2	10'-0"	2	20
15	3"x4"	8'-0"	1	8'-0"	1	8
16	3"x12"	6'-8"	2	14'-0"	1	42
17	3"x10"	7'-0"	2	14'-0"	1	35
18	3"x8"	7'-0"	2	14'-0"	1	28
19	3"x6"	7'-4"	2	16'-0"	1	24
20	3"x6"	7'-8"	2	16'-0"	1	24
			Total F.B.M.			1785

HARDWARE		
No.	Item	Size
212	Split Rings	4" ϕ
2	Machine Bolts	3/4"x9 1/2"
24	" "	3/4"x12 1/2"
66	" "	3/4"x14 1/2"
184	Cut Washers	3"x3"x3/16"

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

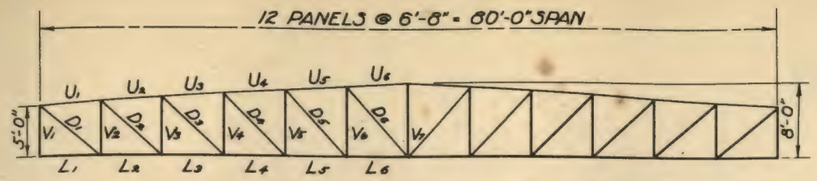
FLAT TOP PRATT
SPAN-60'-0" CENTER HGT-7'-0"

SCALE As Shown SHEET 1 OF 1

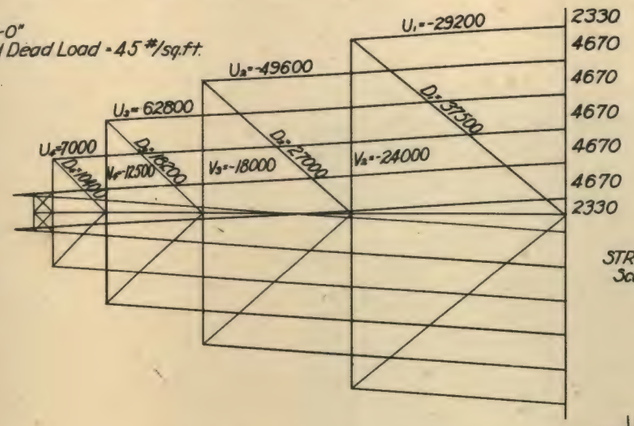
	DATE	DRAWING No.
DESIGNED BY J.H. Carr	4/14/39	77
CHECKED BY F.P.C.	5/18/39	
TRACED BY D.S. Norfar	11/10/39	

Rev. N.M. J.H.C. 10/25/39

24257



Spacing = 16'-0"
Total Live and Dead Load = 45 #/sq.ft.



D_7 3600
D_4 -3000
V_5 -7300
V_6 2700
L_1 0
L_2 29000
L_3 49300
L_4 62600
L_5 69800
L_6 72200

STRESS DIAGRAM
Scale 1" = 10000#

MATERIALS LIST PER TRUSS													
LUMBER CUTTING BILL S43													
Mk.	Size	Length	Make	Cut From	Order	F.B.M.	Mk.	Size	Length	Make	Cut From	Order	F.B.M.
1	4"x12"	17'-6"	4	18'-0"	4	288	15	4"x6"	9'-6"	2	20'-0"	1	40
2	4"x12"	23'-4"	4	24'-0"	4	384	16	4"x6"	10'-10"	2	22'-0"	1	44
3	3"x12"	17'-2½"	4	18'-0"	4	216	17	4"x6"	10'-0"	1	10'-0"	1	20
4	3"x12"	23'-2½"	4	24'-0"	4	288	18	4"x12"	4'-10"	4	12'-0"	2	96
5	4"x12"	7'-6"	2	16'-0"	1	64	19	2"x12"	4'-10"	2	10'-0"	1	20
6	3"x12"	10'-5"	4	16'-0"	4	192	20	3"x12"	5'-4"	4	Pc.No.6		
7	4"x12"	8'-0"	2	16'-0"	1	64	21	4"x12"	5'-4"	2	12'-0"	1	48
8	3"x12"	10'-5"	4	22'-0"	2	132	22	4"x12"	7'-2"	2	10'-0"	2	80
9	4"x8"	8'-3"	2	18'-0"	2	96	23	2"x12"	3'-4½"	2	8'-0"	1	16
10	3"x10"	10'-7"	4	22'-0"	2	110	24	4"x12"	2'-9"	2	Pc.No.22		
11	4"x8"	8'-10"	2	Pc.No.9			25	3"x12"	6'-9"	2	8'-0"	2	48
12	3"x6"	11'-0"	4	22'-0"	2	66	26	3"x12"	11½"	4	Pc.No.25		
13	4"x6"	9'-0"	2	18'-0"	1	36	27	4"x12"	11½"	4	Pc.No.18		
14	3"x6"	11'-0"	4	22'-0"	2	66	28	3"x12"	11½"	8	8'-0"	1	24
											Total F.B.M.		2438

CONNECTORS		
No.	Item	Size
324	S.R.	4"

HARDWARE					
No.	Item	Size	No.	Item	Size
57	Machine Bolts	¾"x16"	4	Machine Bolts	¾"x10½"
65	" "	¾"x18"	264	Plates	3"x3"x3/16"
6	" "	⅞"x18"			

NOTES:

GENERAL-

This truss is designed to be used with loads at top chord panel points only. Purlins 6"x12" are satisfactory.

CAMBER-

The proper camber may be introduced into this truss by raising the lower chord 3" at the center during fabrication.

LUMBER-

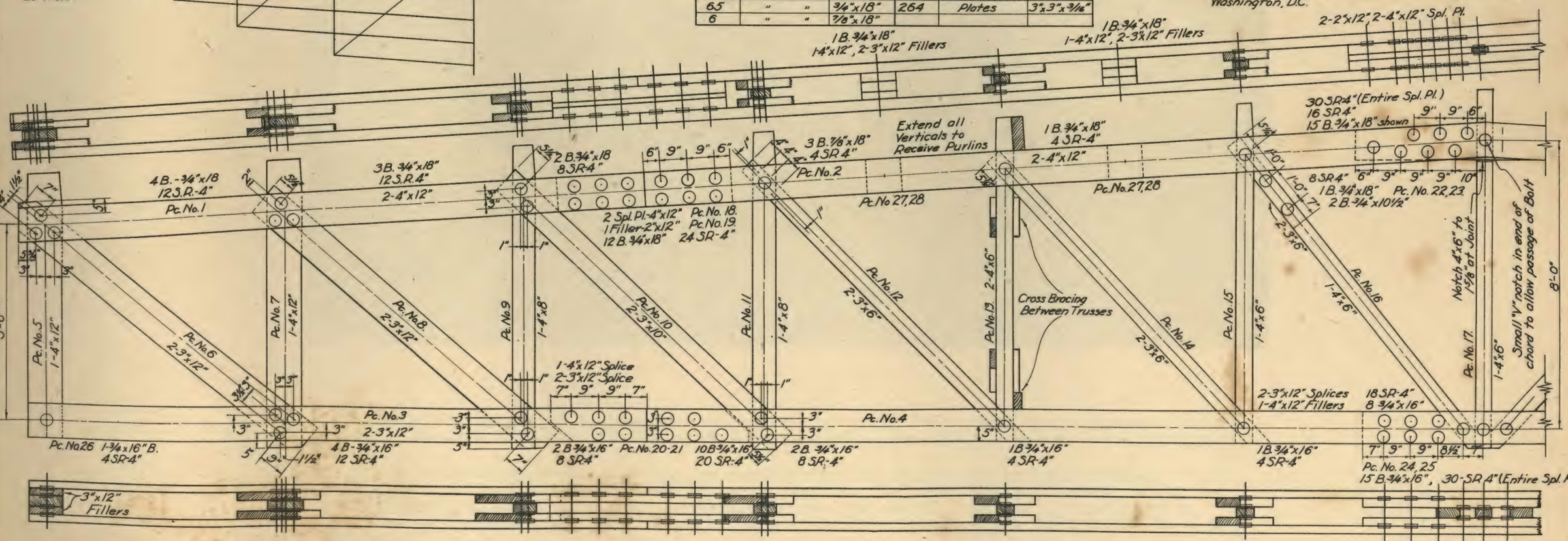
Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of Elasticity

Allowable unit working stresses for commercial grades of lumber are given in the leaflet, "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

CONNECTORS

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.



80'-0" FLAT TOP PRATT TRUSS
Scale: ¾" = 1'-0"
0 1 2 3 4
Scale in feet

Typical design for use of Engineers and Architects

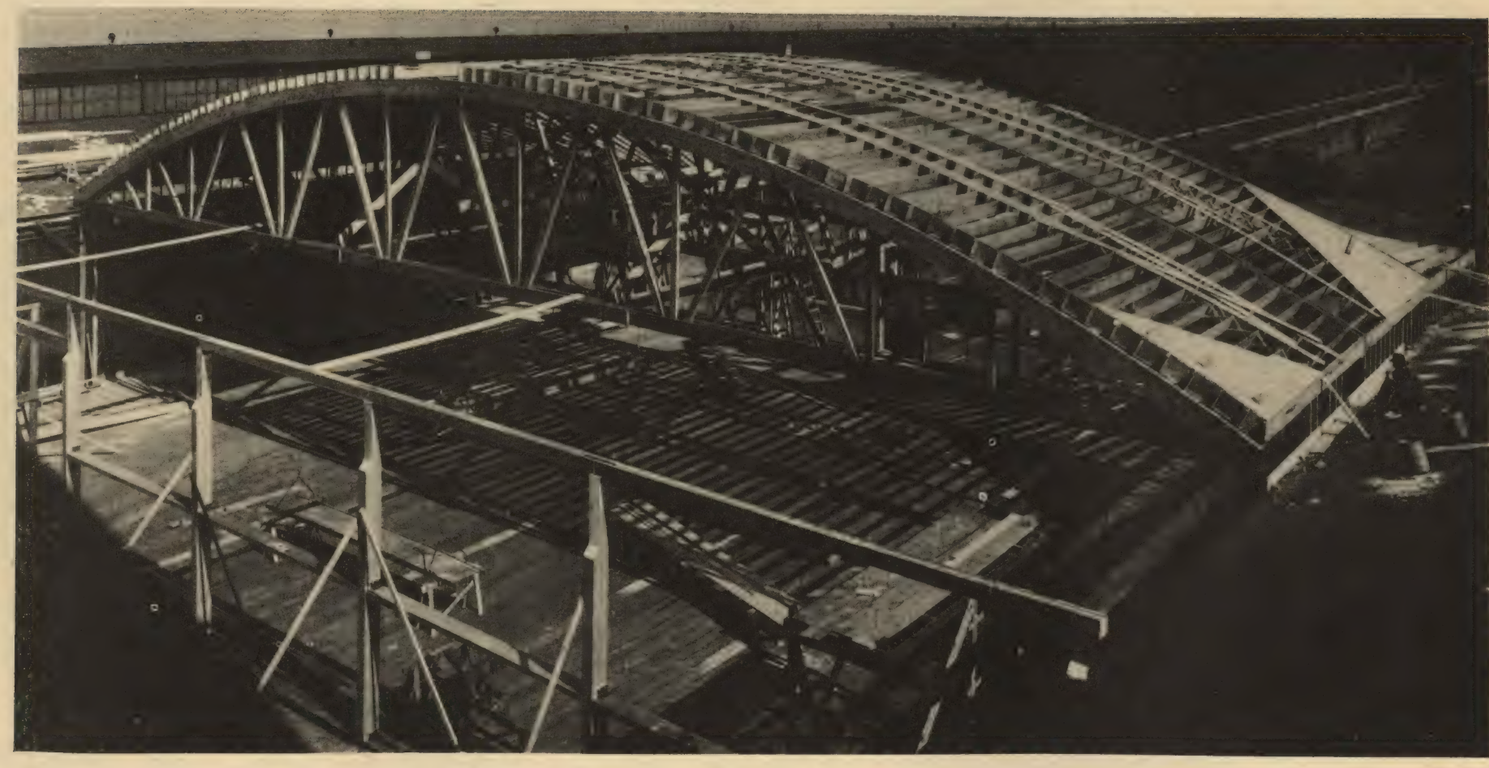
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.
80'-0" FLAT TOP PRATT TRUSS
Spacing 16'-0", Center Hgt. 8'-0"

SCALE ¾" = 1'-0" SHEET 1 OF 1

	DATE	DRAWING No.
DESIGNED BY E.S.L.	10/24/41	381
CHECKED BY R.A.B.	11/20/41	
TRACED BY R.N.C.	11/28/41	

O.K. N.M., R.A.B. 11/29/41.

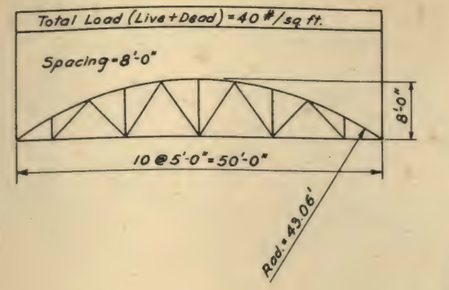
BOWSTRING TRUSSES

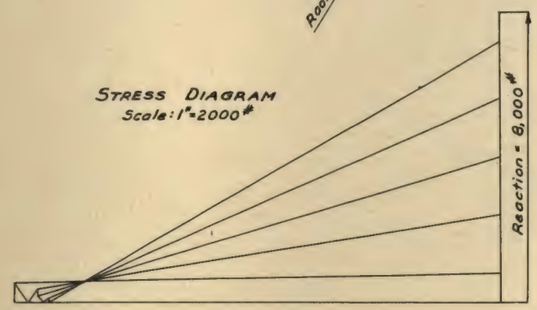


USES: Bowstring trusses are economical for spans from forty to one hundred fifty feet. This type is probably the most efficient type of truss for spans over eighty feet.

The bowstring truss, however, is handled best by regular truss manufacturers. If built by untrained men without the proper equipment, the cost may be unjustly raised due to difficulties arising in the fabrication of the top chord. Unless a fabricator is available to work on the job, it may be more advisable to select the flat top Pratt type of truss.

In addition to being very economical for the longer spans, when handled by experienced parties the bowstring provides a curved roof which has a very attractive appearance.





NOTES

Top chord members are built up to the desired curvature with 2"x3" lumber, glued with casein glue and nailed from both sides with 60d spikes spaced 12" o.c. and in a staggered position about 1" from the edge. This nailing will assist in holding the members in position while the glue is setting up. Laminations are further reinforced at the panel points by a 1/2" through bolt.

In fabrication and assembly, lay out truss as shown. Cut web members off to fit truss, then bore all holes for bolts. Disassemble truss and cut connector grooves. Reassemble truss with connectors in place. Finally lift into place with a gin pole or crane.

Toothed rings, 2 5/8" ϕ may be substituted for 2 1/2" ϕ split rings in the top chord. This will simplify the fabrication.

The truss must be properly braced laterally.

SPECIFICATIONS

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq in. as follows:

880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of elasticity

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet "Working Stresses for Structural Lumber" or are given in the "Grading Rules" available from the Regional Lumber Manufacturers Associations

TIMBER CONNECTORS

Connectors shall be TECO split rings, shear plates, and toothed rings as manufactured by the Timber Engineering Co. Wash., D.C.

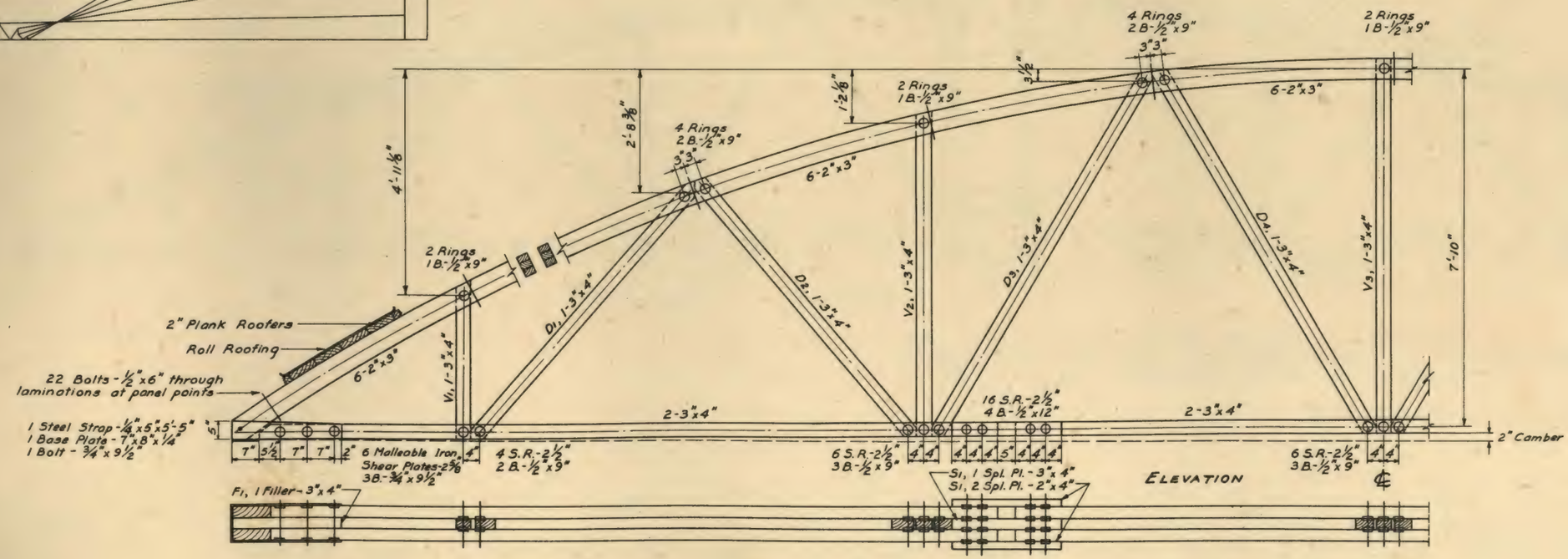
MATERIALS LIST PER TRUSS

Lumber (S4S)

Memb.	Size	Length	Make	Cut From	Order	F.B.M.
Top Chord	2"x3"	32'0"		Random lengths Rip from 2"x8"		160
Bottom Chord	3"x4"	16'-0"	6	16'-0"	6	96
V1	3"x4"	3'-6"	2	16'-0"	2	32
V2	3"x4"	7'-0"	2	14'-0"	1	14
V3	3"x4"	8'-2"	1	10'-0"	1	10
D1	3"x4"	7'-5"	2	16'-0"	1	16
D2	3"x4"	7'-5"	2	16'-0"	1	16
D3	3"x4"	9'-3"	2	See V1		
D4	3"x4"	9'-3"	2	12'-0"	2	24
F1	3"x4"	2'-4 1/2"	2	See V1		
S1	3"x4"	2'-5"	2	See D4		
S1	2"x4"	2'-5"	4	10'-0"	1	7
				Total		375

Hardware

No.	Item	Size
84	Split Rings	2 1/2" ϕ
12	Mall. Iron Sh. Pl.	2 5/8" ϕ
22	Machine Bolts	1/2" x 6"
26	" "	1/2" x 9"
8	" "	1/2" x 12"
8	" "	3/4" x 9 1/2"
112	Cut Washers	1 7/8" ϕ
2	Steel Straps	1/4" x 5" x 5'-5"
2	Base Plates	7" x 8" x 1/4"
Glue & nails as required		



Typical design for use of architects and engineers

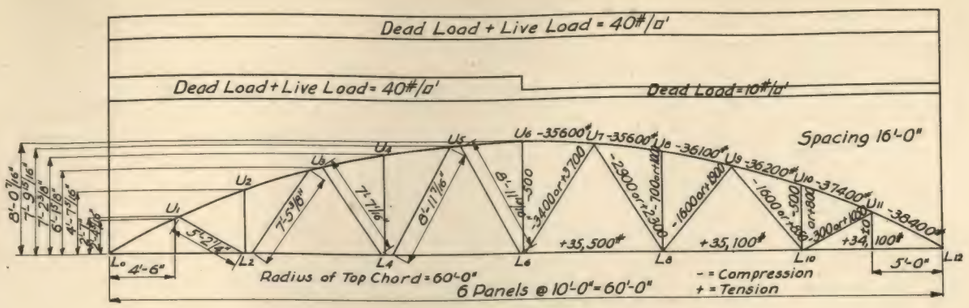
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

BOWSTRING TRUSS
SPAN - 50'-0" RISE - 8'-0"

SCALE As Shown SHEET 1 OF 1

	DATE	DRAWING No.
DESIGNED BY J.H. Corr	5/26/38	267
CHECKED BY D.S. Harter	5/16/40	
TRACED BY D.S. Harter	5/26/40	

Revised N.M. 12/11/39 J.H.C.



Line Diagram
Showing Dimensions and Design Stresses.

NOTE:

Top chord members are built up to the desired curvature with 2"x4" lumber, glued together with casein glue, and nailed with 20d nails, spaced 12" c.c., and in a staggered position, about 1" from each edge. This nailing will assist in holding members in position while glue is setting up. Laminations are further reinforced at panel points by a through bolt ½" in diameter.

When top chord is laid out, cut web members to fit truss, and bore all bolt holes. Truss is then taken apart and grooves cut for the split rings and shear plates; truss is then reassembled.

CAMBER

Camber of 1½" in bottom chord should be provided for when fabricating truss.

NOTES:

LUMBER SPECIFICATIONS

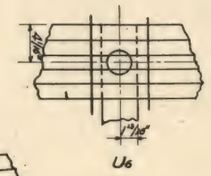
Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

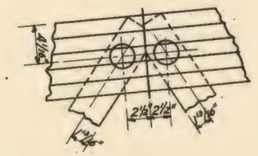
880# Compression parallel to grain.
1200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

SPLIT RING CONNECTORS

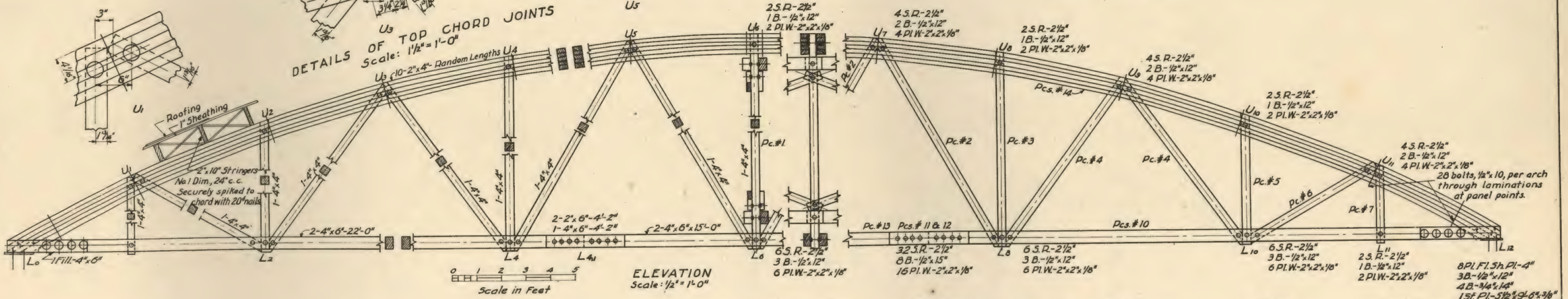
Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.



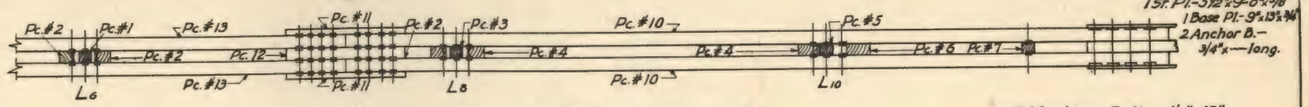


PLAN OF TOP CHORD

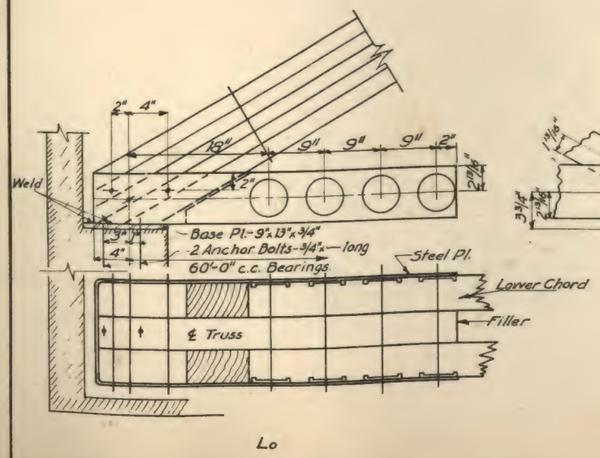
DETAILS OF TOP CHORD JOINTS
Scale: 1½" = 1'-0"

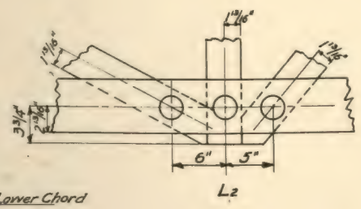


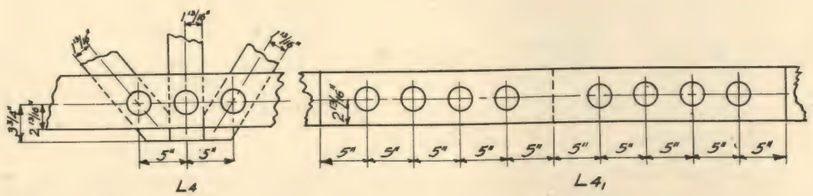
ELEVATION
Scale: ½" = 1'-0"

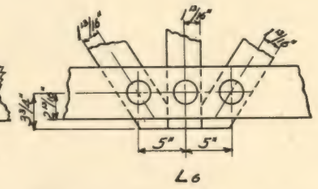


PLAN OF BOTTOM CHORD









DETAILS OF BOTTOM CHORD JOINTS
Scale: 1½" = 1'-0"

40	Machine Bolts	½"x12"
16	" "	½"x15"
28	" "	½"x10"
8	" "	¾"x14"
156	Plate Washers	2"x2"x⅛"
2	Steel Plates	5½"x9'-6"x⅜"
4	Anchor Bolts	¾"x—lg.
2	Base Plates	9"x13"x¾"

Longitudinal bracing and hardware for same is not incl. in Mat'ls. List.

Typical design for use of Engineers and Architects.

MATERIALS LIST (For one truss)

Lumber (S4S)

630'-2"x4"- Random		420 Ft.B.M.	
1 Piece	2"x6"x18'-0"	18	"
5 "	4"x4"x10'-0"	66	"
1 "	4"x4"x12'-0"	16	"
1 "	4"x4"x16'-0"	21	"
3 "	4"x4"x18'-0"	72	"
1 Piece	4"x6"x18'-0"	36 Ft. B.M.	
2 "	4"x6"x16'-0"	64	"
4 "	4"x6"x22'-0"	176	"
	Total	889 Ft.B.M.	

Hardware

16 Pl.F.I. Shear Plates-4" ϕ
132 Split Rings 2½" ϕ

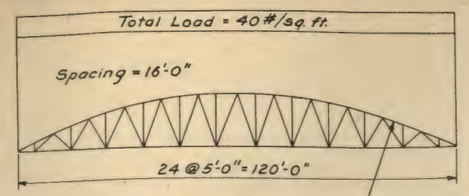
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

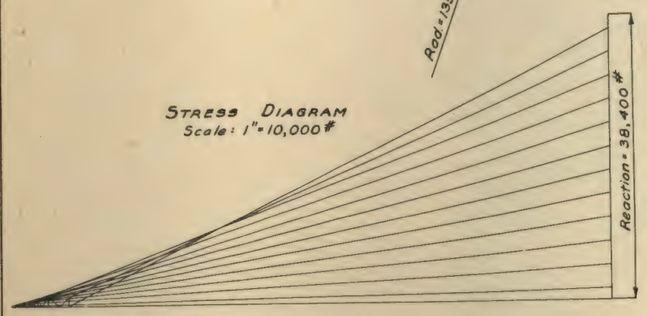
BOWSTRING ROOF TRUSS

Span-60'-0" Spacing-16'-0" c.c.

SCALE ½" = 1'-0" SHEET 1 OF 1
TRACED BY W. ADAM DATE 2/26/63
DESIGNED BY I.D.S.KELLY
CHECKED BY R. LANDSEM 2/26/63
DRAWING NO. 8

Revised-4/4/38 J.H.C.
Revised-N.M.-10/27/39-J.H.C.





STRESS DIAGRAM
Scale: 1" = 10,000#

NOTES

Top chord members are built up to the desired curvature with 2"x4" lumber, glued with casein glue and nailed from both sides with 60 d spikes spaced 12" o.c. and in a staggered position about 1" from the edge. This nailing will assist in holding the members in position while the glue is setting up. Laminations are further reinforced at the panel points by a 1/2" through bolt.

In fabrication and assembly, lay out truss as shown. Cut web members off to fit truss, then bore all holes for bolts. Disassemble truss and cut connector grooves. Reassemble truss with connectors in place. Finally lift into place with a gin pole or crane.

Toothed rings 2 5/8" ϕ may be substituted for 2 1/2" ϕ split rings in the top chord. This will simplify the fabrication.

The truss must be properly braced laterally with "X" braces attached to verticals 20'-0" o.c.

SPECIFICATIONS

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of elasticity

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet "Working Stresses for Structural Lumber" or are given in the "Grading Rules" available from the Regional Lumber Manufacturers Associations

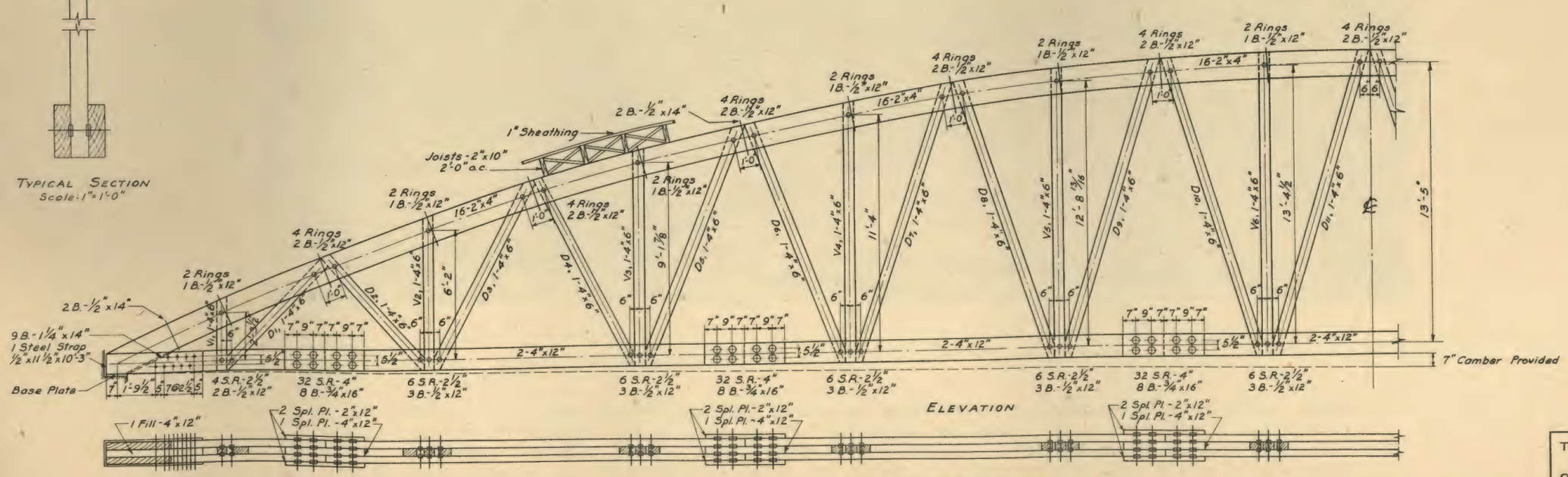
TIMBER CONNECTORS

Connectors shall be TECO split rings and toothed rings as manufactured by the Timber Engineering Co., Wash., D.C.

MATERIALS LIST PER TRUSS

Lumber (S4S)							Hardware		
Memb.	Size	Length	Mate	Cut from	Order	F.B.M.	No.	Item	Size
Top Chord	2"x4"	2100'		Random		1400	136	Split Rings	2 1/2" ϕ
Bottom Chord	4"x12"	20'-0"	10	20'-0"	10	800	192	" "	4" ϕ
"	4"x12"	9'-6"	4	20'-0"	2	160	68	Machine Bolts	1/2"x12"
Splice Plates	4"x12"	3'-10"	6	12'-0"	2	96	50	" "	1/2"x14"
"	2"x12"	3'-10"	12	12'-0"	4	96	48	" "	3/4"x16"
Fill	4"x12"	4'-8"	2	10'-0"	1	40	18	" "	1 1/4"x14"
V1	4"x6"	3'-6"	2	14'-0"	2	56	236	Plate Washers	2"x2"x1/8"
V2	4"x6"	7'-6"	2	20'-0"	2	80	96	" "	3"x3"x3/16"
V3	4"x6"	10'-6"	2	See V1			2	Steel Straps	1/2"x11 1/2"x10'-3"
V4	4"x6"	12'-6"	2	See V2				Glue & Nails as required	
V5	4"x6"	14'-0"	2	14'-0"	2	56			
V6	4"x6"	14'-8"	2	16'-0"	2	64			
D1	4"x6"	7'-3"	2	20'-0"	2	80			
D2	4"x6"	7'-3"	2	20'-0"	2	80			
D3	4"x6"	10'-4"	2	12'-0"	2	48			
D4	4"x6"	10'-4"	2	12'-0"	2	48			
D5	4"x6"	12'-6"	2	See D1					
D6	4"x6"	12'-6"	2	See D2					
D7	4"x6"	14'-4"	2	16'-0"	2	64			
D8	4"x6"	14'-4"	2	16'-0"	2	64			
D9	4"x6"	15'-2"	2	16'-0"	2	64			
D10	4"x6"	15'-2"	2	16'-0"	2	64			
D11	4"x6"	15'-5"	2	16'-0"	2	64			
					Total =	3424			

TYPICAL SECTION
Scale: 1" = 1'-0"



PLAN - BOTTOM CHORD
Scale: 3/8" = 1'-0"

Typical design for use of architects and engineers

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

BOWSTRING TRUSS
SPAN - 120'-0" RISE - 14'-0"

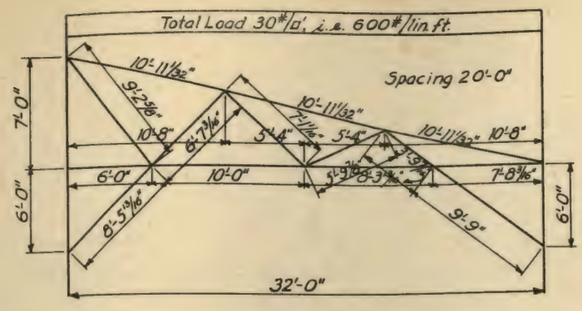
SCALE As Shown SHEET 1 OF 1

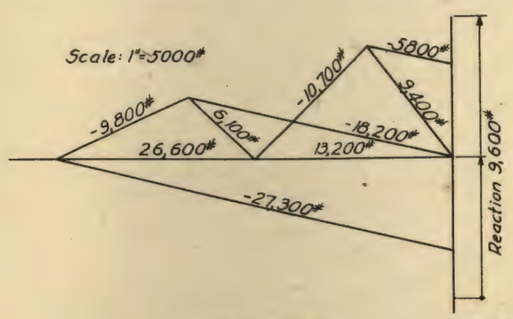
	DATE	DRAWING No.
DESIGNED BY J.H. Corr	12/20/39	255
CHECKED BY D.S. Harter	5/7/40	
TRACED BY D.S. Harter	5/14/40	

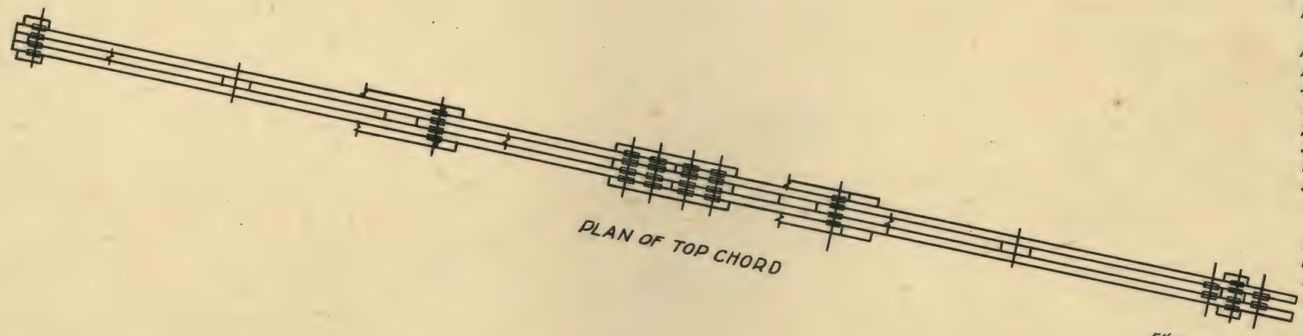
Revised N.M. 12/20/39 J.H.C.

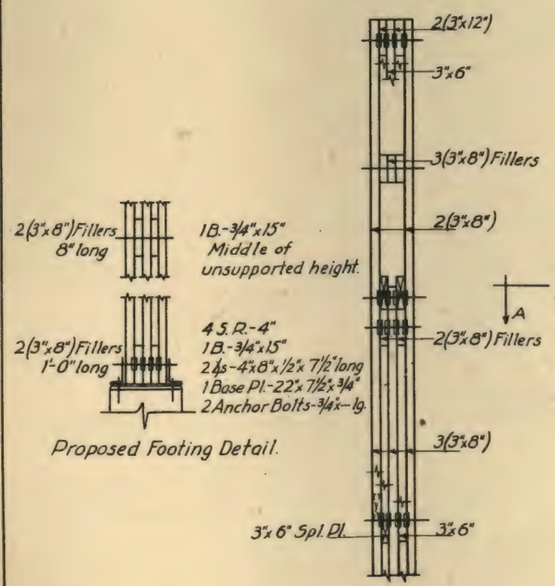
FACTORY TRUSSES

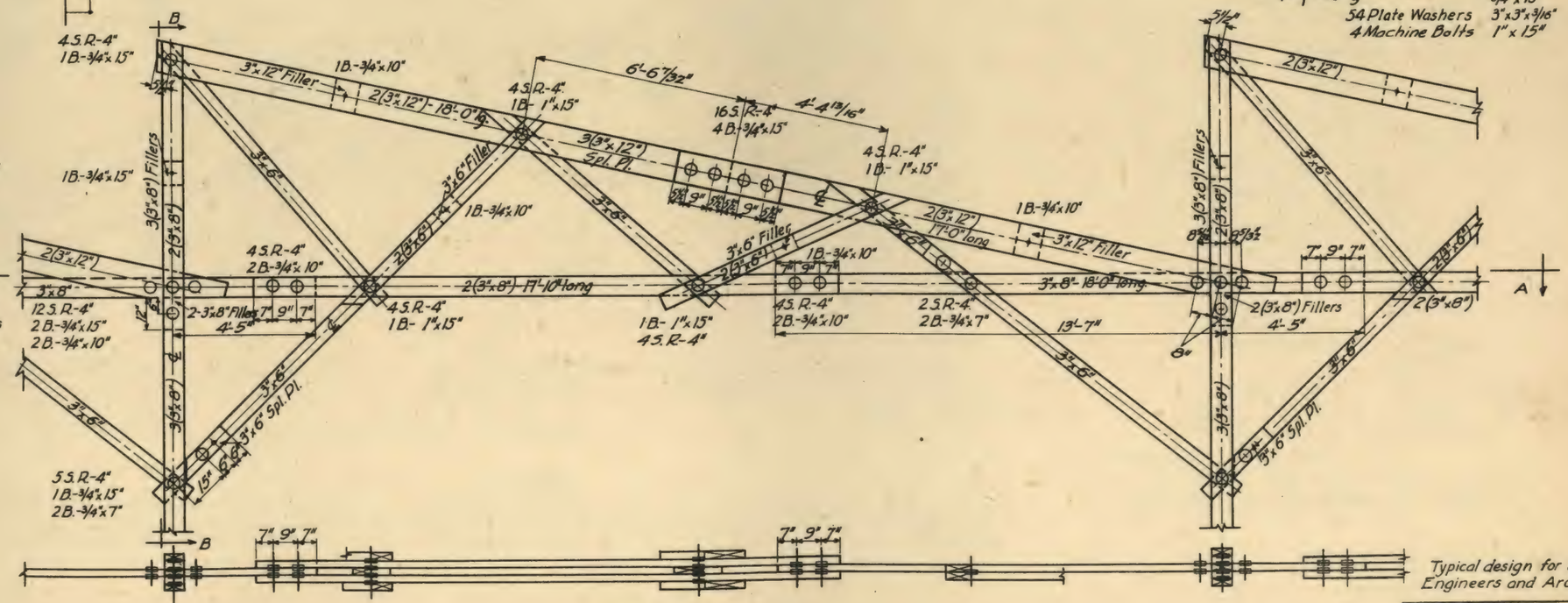
USES: Factory trusses generally are an adaptation or combination of other types. One of the more popular types used is the sawtooth system. This provides a maximum of light by having windows in the front side of the tooth. Combinations of flat trusses or pitched trusses to form several bays and using skylights or monitors are often used. Low cost factories, warehouses, etc. may be built with trusses of this classification.











PLAN OF BOTTOM CHORD
A-A

0 1 2 3 4
Scale in Feet

NOTES:

LUMBER SPECIFICATIONS.

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq.in. as follows:

1200# Compression parallel to grain.
1600# Extreme fiber in bending.
1,600,000# Modulus of elasticity

Allowable unit working stresses for commercial grades are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

SPLIT RING CONNECTORS.

Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST (One truss & one column.)

Lumber (545)

4 Pieces	3"x12"x 18'-0"	216	Ft. B.M.
1 "	3"x12"x 12'-0"	36	"
2 "	3"x6"x18'-0"	54	"
3 "	3"x8"x24'-0"	144	"
3 "	3"x8"x 18'-0"	108	"
9 "	3"x6"x 16'-0"	72	"
	Total	630	Ft. B.M.

Hardware (Below knee brace not listed).

63 Split Rings	4" ϕ
4 Machine Bolts	3/4"x 7"
10 "	3/4"x 10"
9 "	3/4"x 15"
54 Plate Washers	3"x3"x3/16"
4 Machine Bolts	1"x 15"

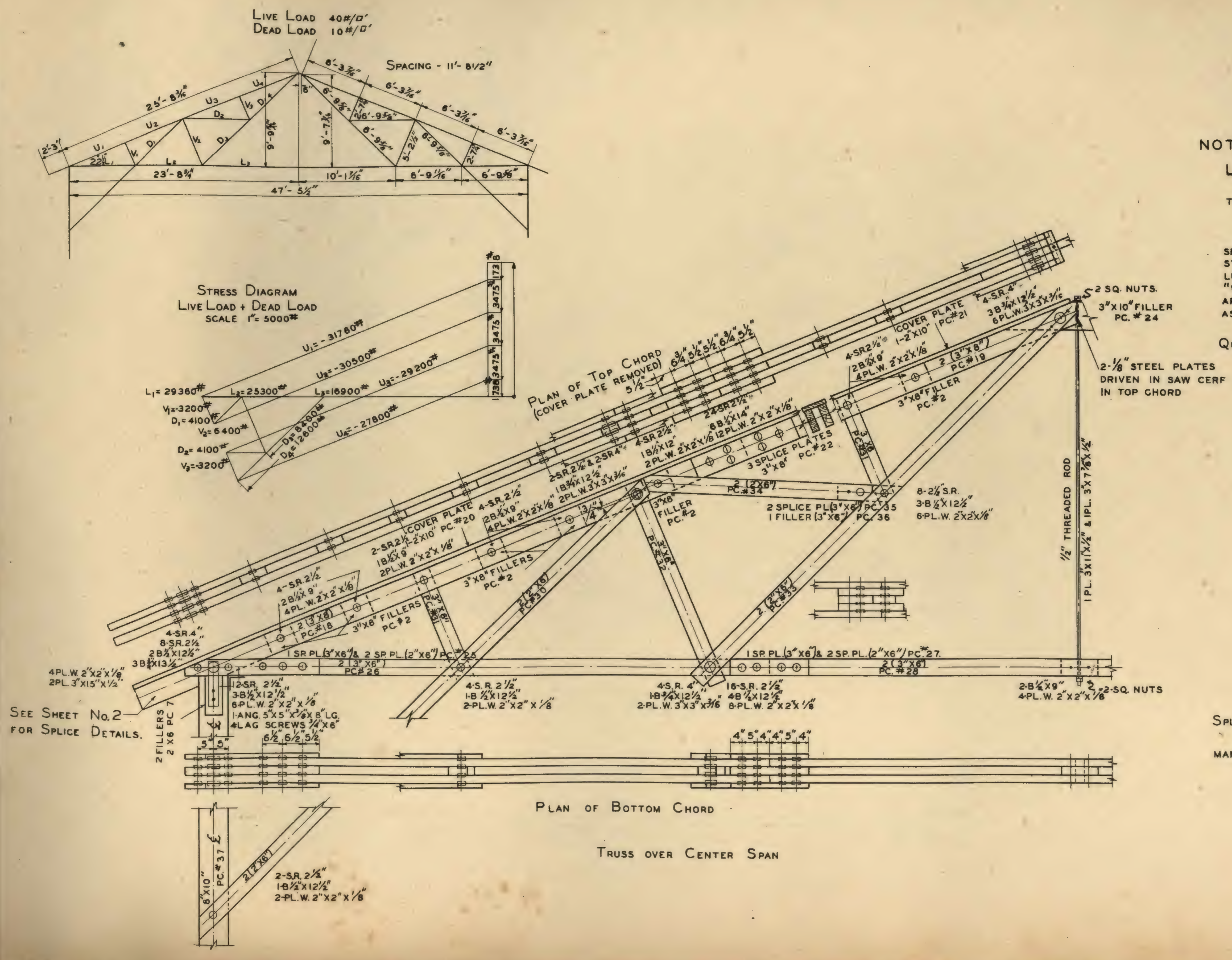
Typical design for use of Engineers and Architects.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

SAW TOOTH ROOF
32'-0" Span 7'-0" Rise

SCALE 1/2"=1'-0" SHEET 1 OF 1
TRACED BY W. ADAM DATE 3/1/57
DESIGNED BY P. LANDSEM 12/1/56
CHECKED BY J. CARR 3/4/57
DRAWING NO. 205

Rev. N.M. 10/27/59 J.H.C.



NOTES

Lumber Specifications

LUMBER SHALL BE OF A GRADE WHICH PROVIDES THE FOLLOWING SAFE UNIT WORKING STRESSES:

1200# F (FIBER STRESS)
880# C (COMPRESSION PARALLEL TO GRAIN)
1,600,000# E (MODULUS OF ELASTICITY)

SPECIFIC GRADES AND ALLOWABLE UNIT WORKING STRESSES ARE GIVEN IN THE ATTACHED NATIONAL LUMBER MANUFACTURERS ASSOCIATION LEAFLET "WORKING STRESSES FOR LUMBER AND TIMBER" OR ARE AVAILABLE FROM REGIONAL LUMBER MANUFACTURERS ASSOCIATIONS.

Quantities per Truss

Lumber

4	PIECES	2"X6"X10'-0"	40 FT. B. M.
8	"	2"X6"X18'-0"	144 "
2	"	2"X10"X10'-0"	33 "
2	"	2"X10"X18'-0"	60 "
9	"	3"X6"X16'-0"	216 "
4	"	3"X8"X12'-0"	96 "
5	"	3"X8"X18-0"	180 "
1	"	3"X10"X4'-0"	10 "
		TOTAL	779 FT. B. M.

Hardware

NO.	ITEM	SIZE
188	TECO SPLIT RINGS	2 1/2" ϕ
28	"	4" ϕ
16	MACHINE BOLTS	1/2"X9"
30	"	1/2"X12 1/2"
12	"	1/2"X14"
10	"	3/4"X12 1/2"
6	"	3/4"X13 1/2"
2	ANGLES	5"X5"X3/8"X8" LG.
8	LAG SCREWS	3/4"X6"
1	STEEL PLATES	1/2"X3"X7 7/8" LG.
1	"	1/2"X3"X11" "
4	"	1/2"X3"X1'-3" "
1	THREADED ROD	1/2"X10'-9" THR'D. 3" BOTH ENDS
116	PLATE WASHERS	2"X2"X1/8" PUNCHED 9/16" ϕ
20	"	3"X3"X3/16" " 13/16" ϕ
2	STEEL PLATES	2 5/8"X7"X1/8"

Split Ring Connectors

CONNECTORS SHALL BE TECO SPLIT RINGS AS MANUFACTURED BY THE TIMBER ENGINEERING CO.

TYPICAL DESIGN FOR INFORMATION OF ARCHITECTS AND ENGINEERS.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

ROOF TRUSS

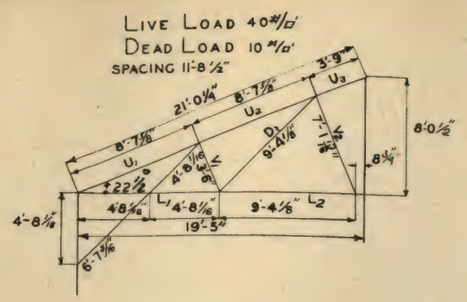
CENTER SPAN - 47'-5 1/2"

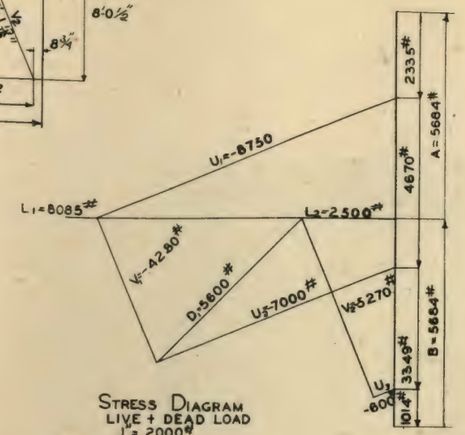
SCALE 3/4" = 1'-0" SHEET 1 OF 4

TRACED BY	J.H.C.	DATE
DESIGNED BY	R.L.	4/1/36
CHECKED BY	I.D.S.K	4/11/36

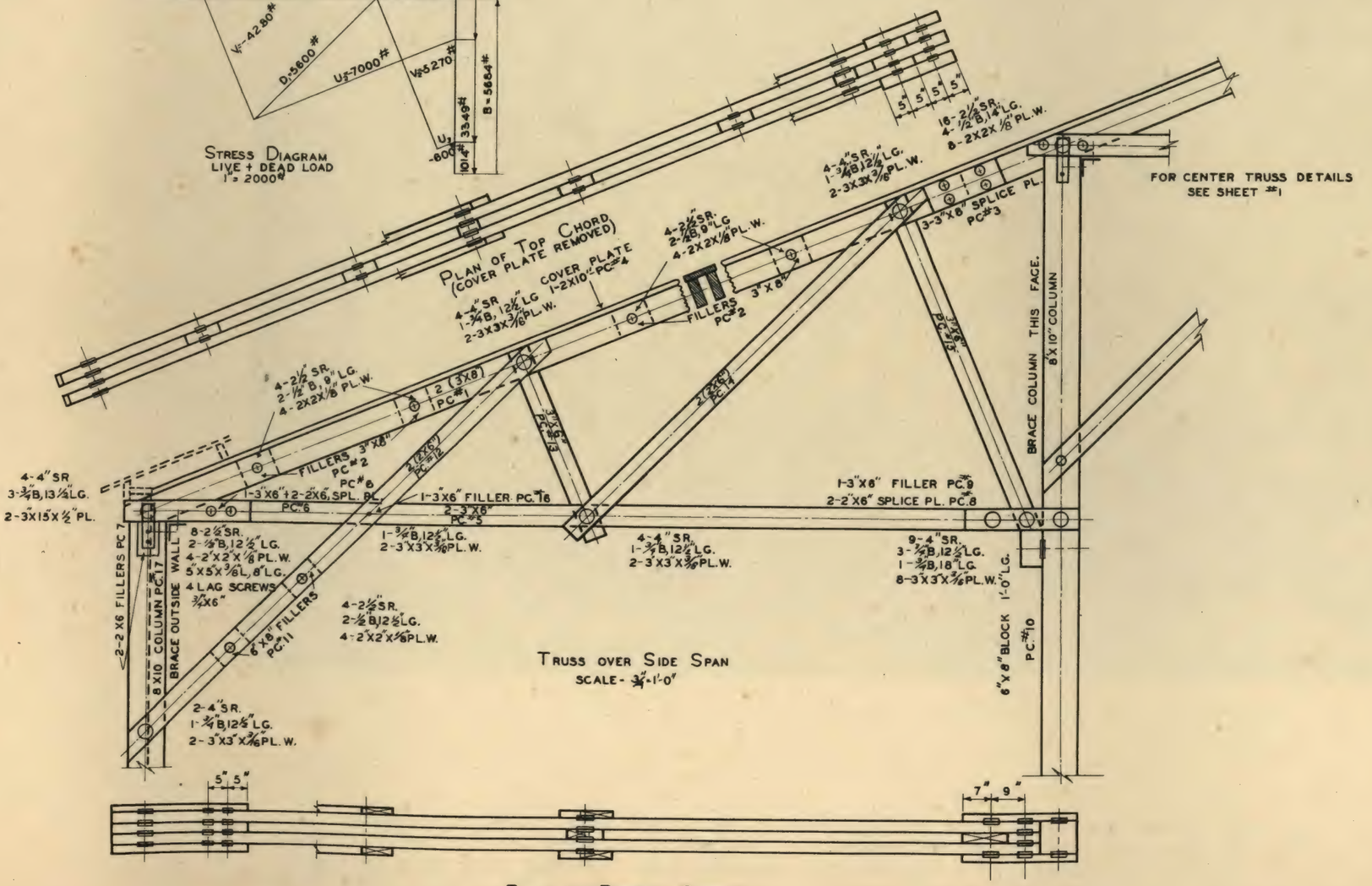
DRAWING No. 171

REV. N.M. 12/7/39 J.H.C.





STRESS DIAGRAM
LIVE + DEAD LOAD
1" = 2000#



TRUSS OVER SIDE SPAN
SCALE - 3/4" = 1'-0"

PLAN OF BOTTOM CHORD

NOTES

LUMBER SPECIFICATIONS

LUMBER SHALL BE OF A GRADE WHICH PROVIDES THE FOLLOWING SAFE UNIT WORKING STRESSES:

1200#F (FIBER STRESS)
880#C (COMPRESSION PARALLEL WITH GRAIN)
1,600,000#E (MODULUS OF ELASTICITY)

SPECIFIC GRADES AND ALLOWABLE UNIT WORKING STRESSES ARE GIVEN IN THE ATTACHED NATIONAL LUMBER MANUFACTURERS ASSOCIATION LEAFLET "WORKING STRESSES FOR LUMBER AND TIMBER" OR ARE AVAILABLE FROM REGIONAL LUMBER MANUFACTURERS ASSOCIATIONS.

QUANTITIES PER TRUSS

LUMBER

2 PIECES	2"X6"X18'-0"	36 FT. B.M.
2 "	2"X6"X12'-0"	24 " "
2 "	3"X6"X20'-0"	60 " "
1 "	3"X6"X16'-0"	24 " "
2 "	3"X8"X20'-0"	80 " "
1 "	3"X8"X8'-0"	16 " "
1 "	6"X8"X2'-6"	10 " "
1 "	2"X10"X20'-0"	34 " "
	TOTAL	284 FT. B.M.

HARDWARE

NO.	ITEM	SIZE
38	TECO SPLIT RINGS	2 1/2" ϕ
27	" " "	4 ϕ
4	MACHINE BOLTS	1/2"X 9"
4	" "	1/2"X12 1/2"
4	" "	1/2"X14"
8	" "	3/4"X12 1/2"
3	" "	3/4"X13 1/2"
1	" "	3/4"X18"
1	ANGLE	5"X5"X3/8"X8" LG.
4	LAG SCREWS	3/4"X6"
2	STEEL PLATES	3"X15"X1/2"
24	PLATE WASHERS	2"X2"X1/8" PUNCHED 9/16" ϕ
18	" "	3"X3"X3/8" " 13/16" ϕ

SPLIT RING CONNECTORS

CONNECTORS SHALL BE TECO SPLIT RINGS AS MANUFACTURED BY THE TIMBER ENGINEERING COMPANY

TYPICAL DESIGN FOR INFORMATION OF ARCHITECTS AND ENGINEERS

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

ROOF TRUSS
SIDE SPAN - 19'-5"

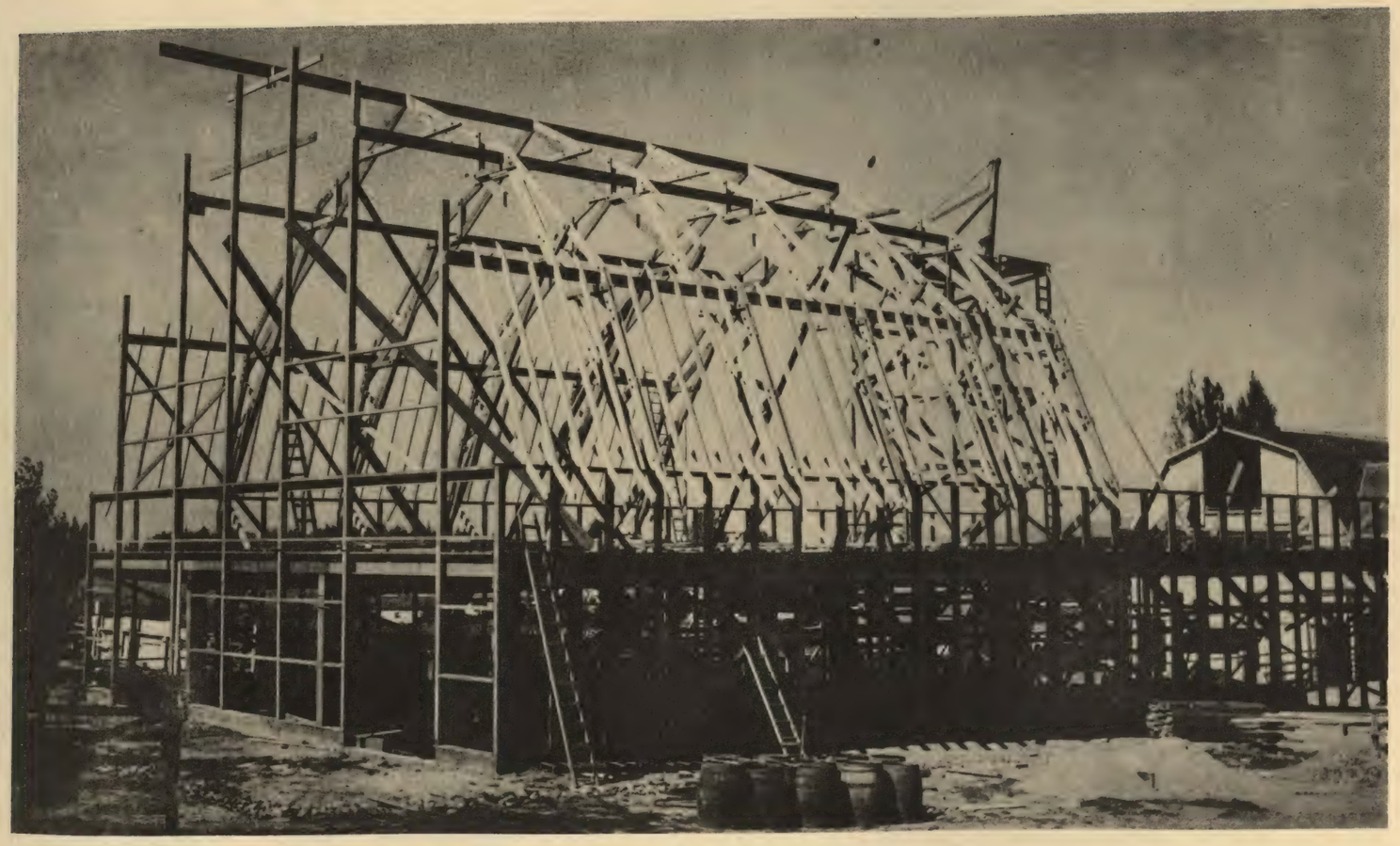
SCALE 3/4" = 1'-0" SHEET 2 OF 4

TRACED BY J.H.C. DATE 9/1/36
DESIGNED BY P.L.
CHECKED BY I.D.S.K. 9/11/36

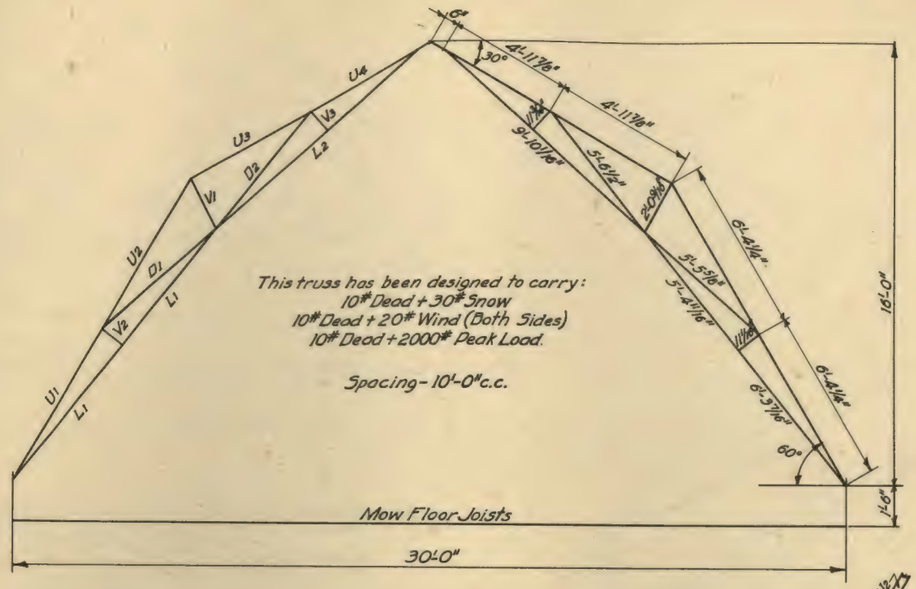
DRAWING NO. 171

REV. N.M. 12/7/39 J.H.C.

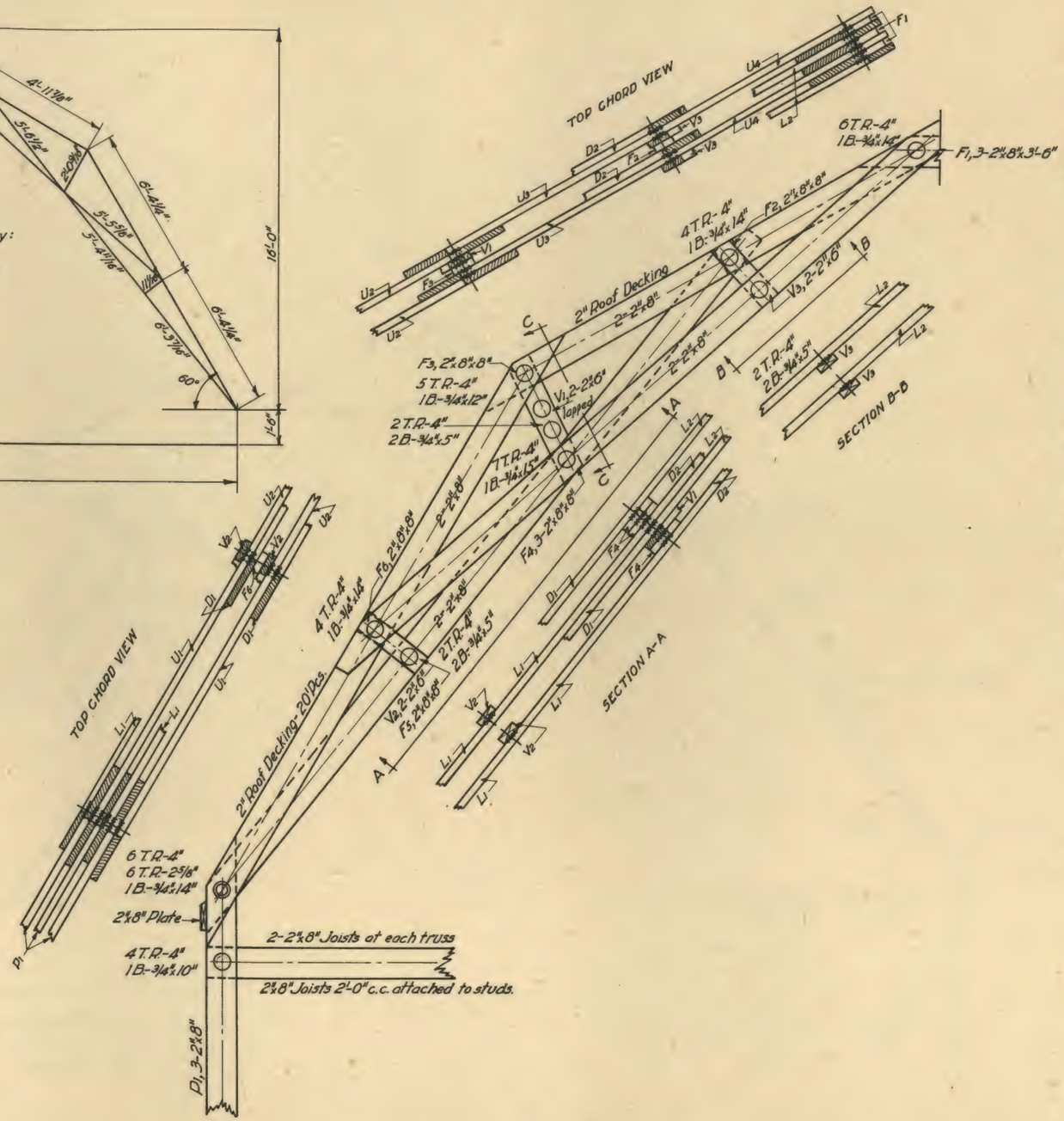
BARN TRUSSES

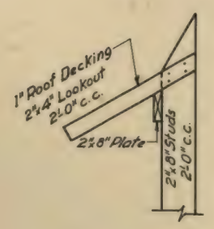


USES: Barn trusses are usually employed between spans of twenty-five and fifty feet. They must be simple in design and construction so that they may be handled by the usual type of farm labor. The gambrel type shown in the photo and in design No. 216 has been very popular during recent years. It provides a maximum of mow space at a minimum of cost in addition to providing an attractive building.

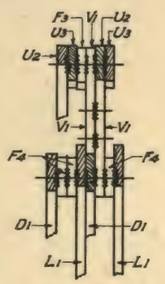


Member	U_1	U_2	U_3	U_4	L_1	L_2	D_1	D_2	V_1
Critical Load	-8800	-5600	-5300	-7100	-9700	-6000	-3600	-1800	-1800





DETAIL OF LOOKOUT AT EAVES



SECTION C-C

NOTES:

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO toothed rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST PER TRUSS

LUMBER (S4S) Posts not included

1 Piece	2"x6"x10'-0"	10	Ft. B.M.
1 "	2"x6"x12'-0"	12	"
5 "	2"x8"x12'-0"	80	"
4 "	2"x8"x16'-0"	86	"
4 "	2"x8"x18'-0"	96	"
4 "	2"x8"x20'-0"	107	"

Total - 391 Ft. B.M.

HARDWARE

84	Toothed Rings	4"
12	" "	2 5/8"
12	Machine Bolts	3/4"x5"
2	" "	3/4"x10"
2	" "	3/4"x12"
8	" "	3/4"x14"
2	" "	3/4"x15"
52	Plate Washers	3 1/2"x3 1/2"x3/8"

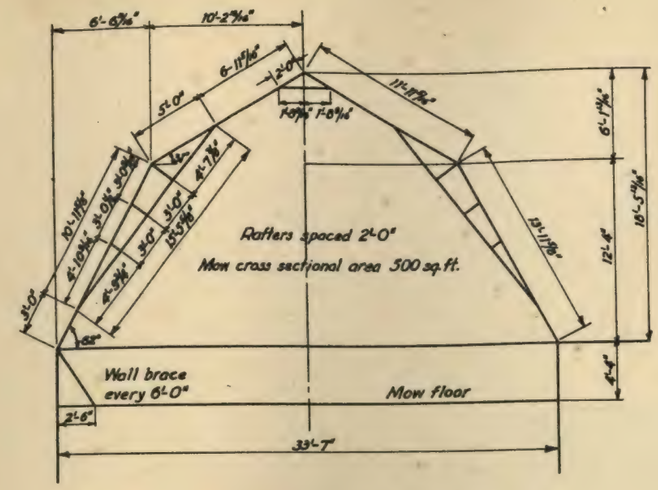
Typical design for use of Architects and Engineers

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.
BARN TRUSS
GAMBREL TYPE
SPAN 30'-0" RISE 16'-0"

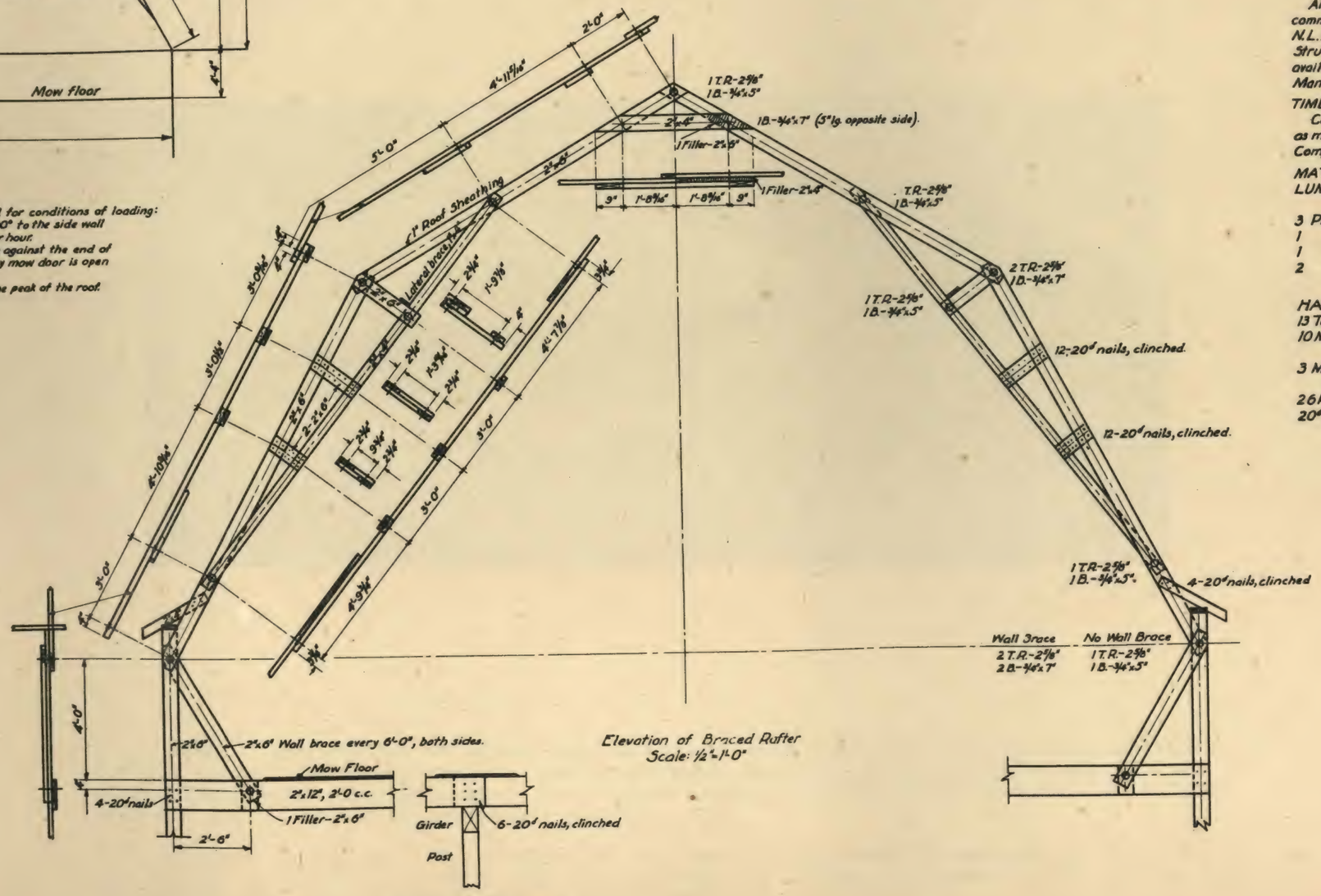
SCALE 3/4" = 1'-0" SHEET 1 OF 1

		DATE	DRAWING NO.
DESIGNED BY	J.H. CARR	2/6/37	210
CHECKED BY	F.R.C.	11/5/37	
TRACED BY	W. ADAM	1/3/38	

O.K. N.M. 12/15/39 J.H.C.



This design has been investigated for conditions of loading:
1. Wind blowing at an angle of 90° to the side wall with a velocity of 70 miles per hour.
2. Wind of same velocity blowing against the end of the barn where the large hay mow door is open into the wind.
3. Hay track load of 1000# at the peak of the roof.



Elevation of Braced Rafter
Scale: ½"=1'-0"

Overlap Joint over Post

NOTES

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

Allowable unit working stresses for commercial grades are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Connectors shall be TECO toothed rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST

LUMBER (wall and wall brace above mow floor not included).

3	Pieces	2"x6"x16'-0"	48	Ft. B.M.
1	"	2"x6"x18'-0"	18	"
1	"	2"x4"x12'-0"	8	"
2	"	2"x4"x16'-0"	22	"
		Total	96	Ft. B.M.

HARDWARE

13 Toothed Rings - 2⅝"ϕ
10 Machine Bolts - ¾"x5"
(8 when wall brace is used).
3 Machine Bolts - ¾"x7"
(5 when wall brace is used).
26 Plate Washers - 3"x3"x⅛"
20d Nails as required.

Typical design for use of Engineers and Architects.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

BRACED RAFTER ROOF

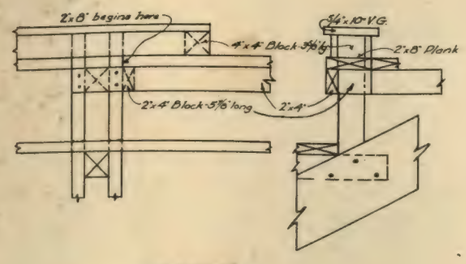
Span-34' Height-22'-6" Spacing-2'-0"

SCALE ½"=1'-0"	SHEET 1 OF 1	
TRACED BY W. ADAM DATE 4/4/37		DRAWING NO.
DESIGNED BY P. LANDSEM 3/1/37		216
CHECKED BY J. CARR 3/19/37		O.K.

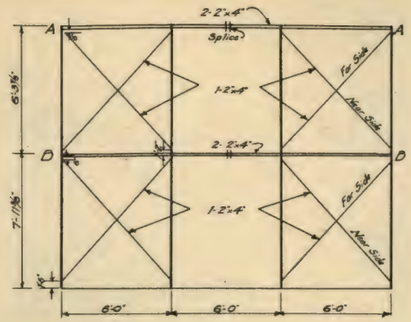
GRANDSTANDS

USES: Grandstands in timber can be economically constructed to handle spectators for all types of entertainment. They usually are constructed so that they may be extended to increase the capacity. They may be constructed either in demountable or fixed form and may be used with or without a roof.

Typical design No. 109 contained in this set has been widely employed in the U.S. and Canada and architects, engineers, contractors and owners all have reported favorably on the strength and economy resulting from adaptations of this plan.

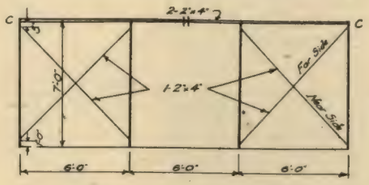


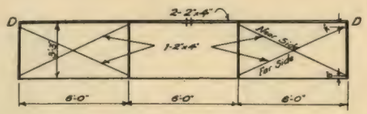
AISLE DETAIL
Scale 1"=1'-0"

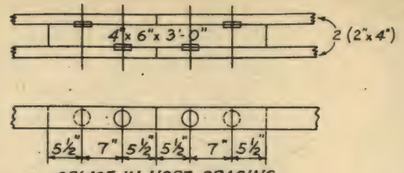


END BAYS

The c-c dimension in end bays of stand shall be 5'-0 7/16" instead of 6'-0"





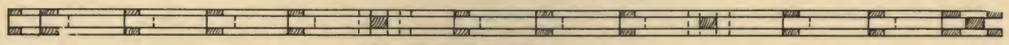


SPLICE IN HORZ. BRACING
Scale 1"=1'-0"
4-S.R. 2½"ϕ - 4-D. ½"x10"-B. Pl. W. 2"x2"x1/16"
Spacing - 12'-0"

LONGITUDINAL BRACING

Diagonals are attached to posts by 1 TECO Split Ring, 2½"ϕ
1-½"x 8½" Bolt and 2-2"x2"x1/16" Plate Washers per joint.
Horizontals have 2-2½" S.R., 1-½"x10" B. and 2-2"x2"x1/16" Pl. W per joint.

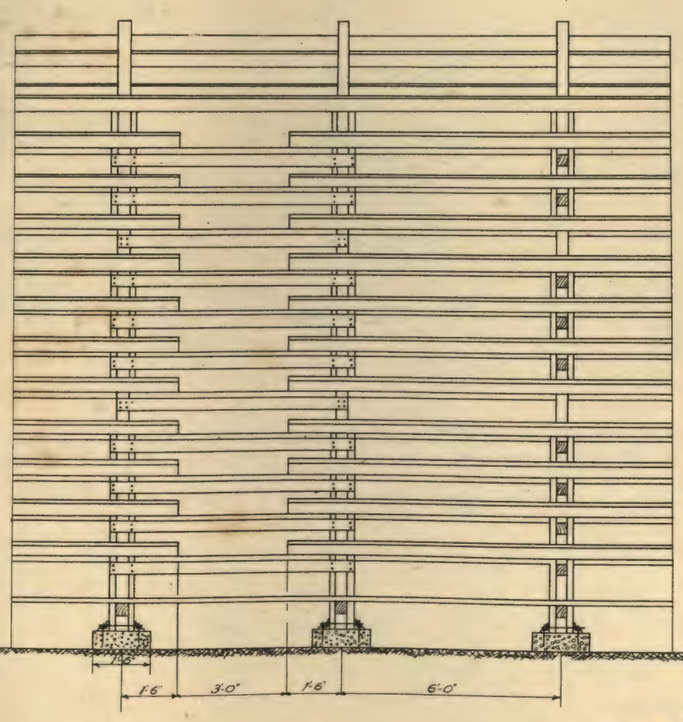
Diagonal Bracing in odd Numbered Bays.



TOP VIEW OF BENT

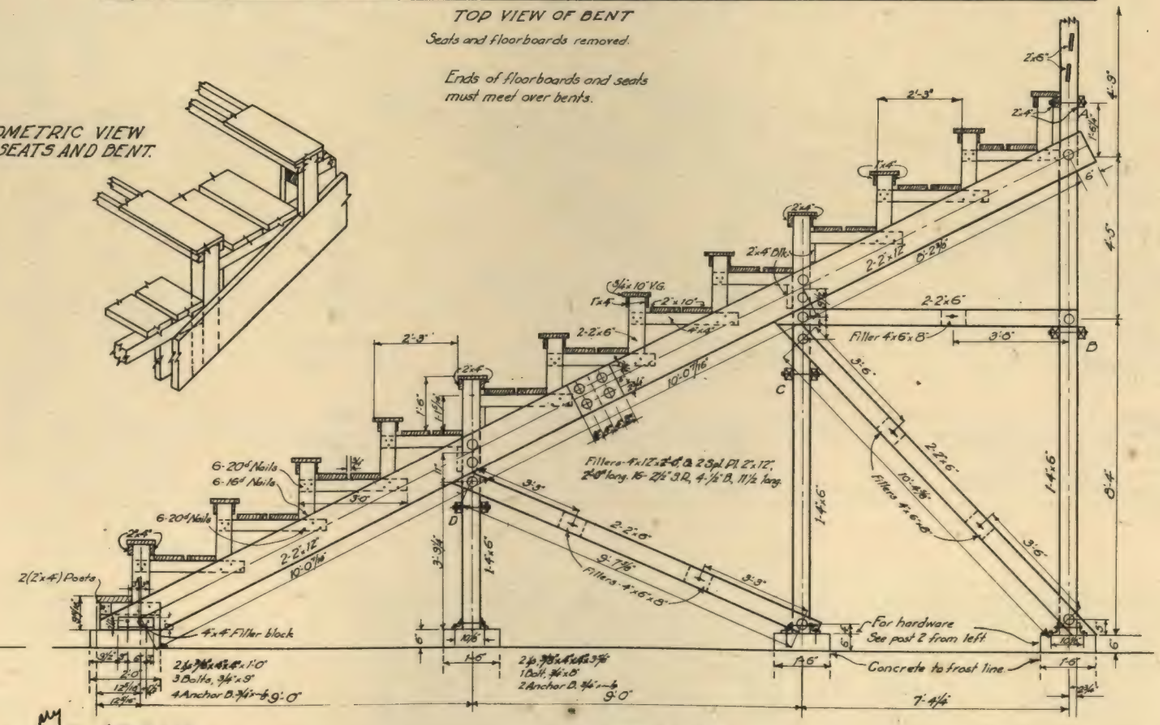
Seats and floorboards removed.

Ends of floorboards and seats must meet over bents.

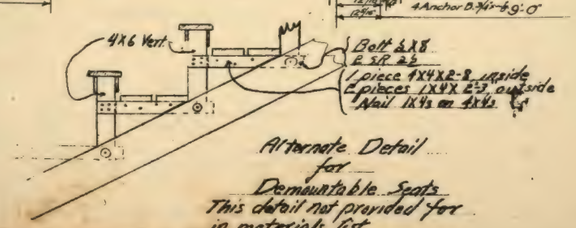


FRONT VIEW WITH AISLE
AISLES ARE SPACED 42'-0" c to c

ISOMETRIC VIEW OF SEATS AND BENT.



TYPICAL BENT
6'-0" c.to c.
0 1 2 3 4
Scale in Feet



Alternate Detail for Demountable Seats
This detail not provided for in materials list.

NOTES:

GENERAL-
This design has been prepared in accordance with proposed A.S.A. Spec. Side Rails not Shown.

LUMBER SPECIFICATIONS

Lumber shall be of a structural grade with the following allowable working stresses in lbs. per sq. in:
880# Compression parallel to grain.
1200# Extreme fibre in bending.
1600,000# Modulus of Elasticity.
Allowable unit working stresses for commercial grades of lumber are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber" or are available from the Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS.

Connectors shall be TECO Split Rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIAL LIST.
(12 Ft. Section with Aisle at Center)

LUMBER 545

1 Piece	4"x12"x16'-0"	64 Ft. B.M.	
33 "	2"x12"x16'-0"	1056	"
2 "	2"x12"x16'-0"	64	"
20 "	4"x6"x18'-0"	720	"
46 "	2"x10"x12'-0"	920	"
23 "	2"x10"x18'-0"	690	"
25 "	3/4"x10"x12'-0"	313	"
23 "	3/4"x10"x8'-0"	192	"
5 "	2"x8"x12'-0"	80	"
1 "	2"x8"x6'-0"	8	"
22 "	4"x4"x12'-0"	352	"
23 "	2"x6"x12'-0"	276	"
17 "	2"x6"x14'-0"	238	"
20 "	2"x6"x16'-0"	320	"
29 "	2"x4"x12'-0"	232	"
20 "	2"x4"x16'-0"	214	"
16 "	2"x4"x18'-0"	192	"
35 "	1"x4"x12'-0"	140	"
33 "	1"x4"x8'-0"	88	"
	Total =	6159 Ft. B.M.	

HARDWARE.

480	TECO Split Rings, 2½"ϕ	
192	Machine Bolts, ½"x8½"	
80	" "	½"x10"
32	" "	½"x11½"
24	" "	¾"x8"
24	" "	¾"x9"
80	Anchor Bolts	¾"x — "
608	Plate Washers	2"x2"x1/16"
	16d and 20d nails as required.	
48	Angles 4"x4"x⅜", 3'-8" long.	
16	" 4"x4"x⅜", 1'-0" long.	

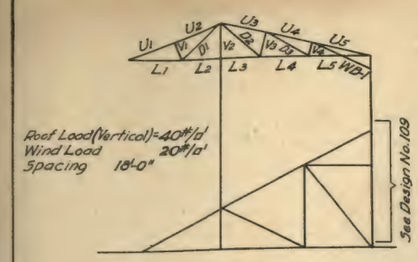
Typical design for use of Engineers and Architects.

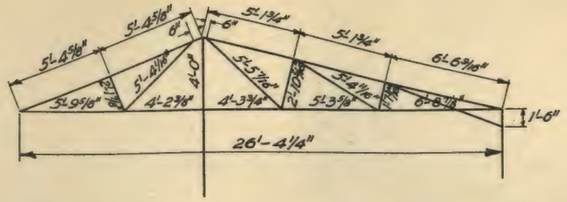
LEGEND: (except as noted)
○ 2-TECO Split Rings 2½"ϕ, 1 Bolt ½"x8½", 2 Plate Washers 2"x2"x1/16"
• Nails of appropriate size
→ 1 Bolt ½"x8½", 2 Plate Washers 2"x2"x1/16"

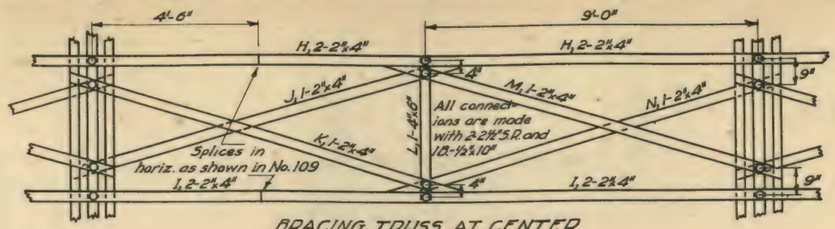
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

PERMANENT GRANDSTAND
Capacity 312

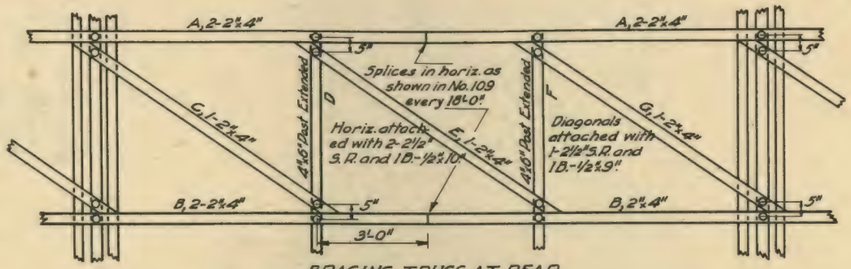
SCALE ½"=1'-0" SHEET 1 OF 1
TRACED BY W.A. Adam 12/29/36 DATE
DESIGNED BY Carl C. 10/29/36
CHECKED BY P. Landsteen 11/4/36
DRAWING NO. 109
SUGGESTIONS BY L.R. Keith.
Revised Apr. 7, 1939 Rev. N.M. 10/29/36 L.R.K.







BRACING TRUSS AT CENTER
Scale: 1/2"=1'-0"



BRACING TRUSS AT REAR
Scale: 1/2"=1'-0"

NOTES:

LUMBER SPECIFICATIONS

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:
- 880# Compression parallel to grain.
- 1,200# Extreme fiber in bending.
- 1,600,000# Modulus of elasticity.

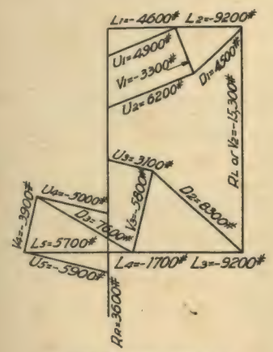
Allowable unit working stresses for commercial grades of lumber are given in the National Lumber Manufacturers Association's leaflet, "Working Stresses for Structural Lumber and Timber," or are given in the Grading Rules available from the Regional Lumber Manufacturers Assns.

TIMBER CONNECTORS

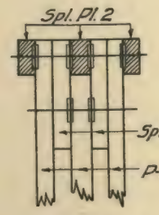
Connectors shall be TECO split rings as manufactured by the Timber Engineering Company, Washington, D.C.

NOTE REGARDING MATERIALS LISTS

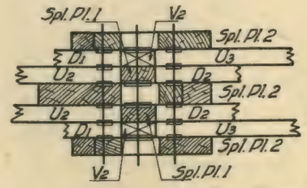
The materials lists, below, show the materials required in addition to those shown on design No. 109 in order to provide design No. 109 with a roof. The lumber for the front and rear posts of design No. 109 should be deducted from the combined lists and the 6-1/2"x8 1/2" bolts used for connections on the posts should also be deducted.

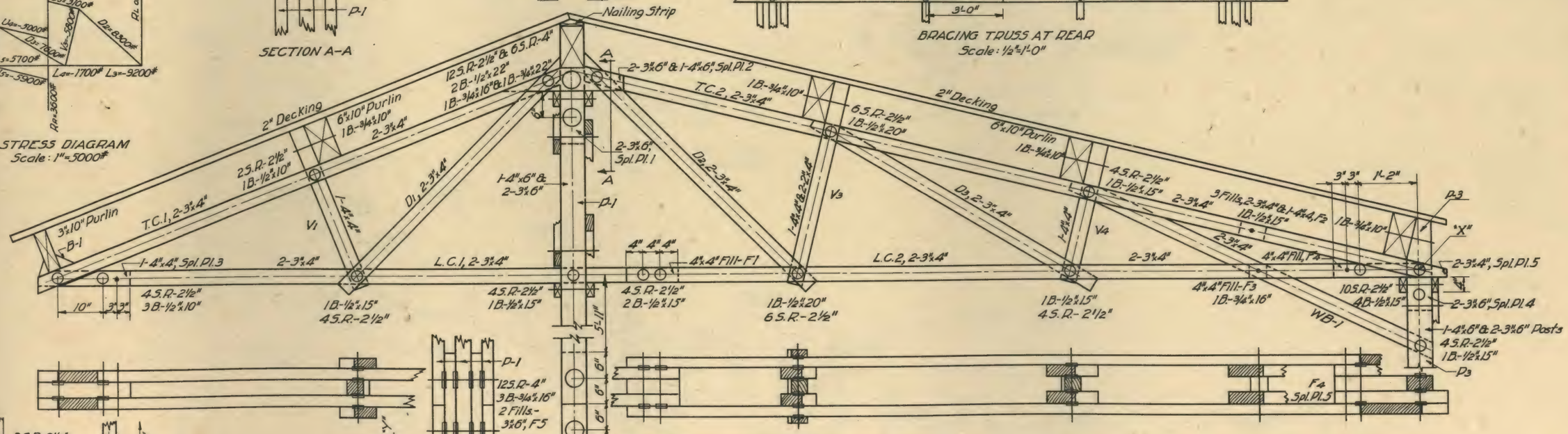


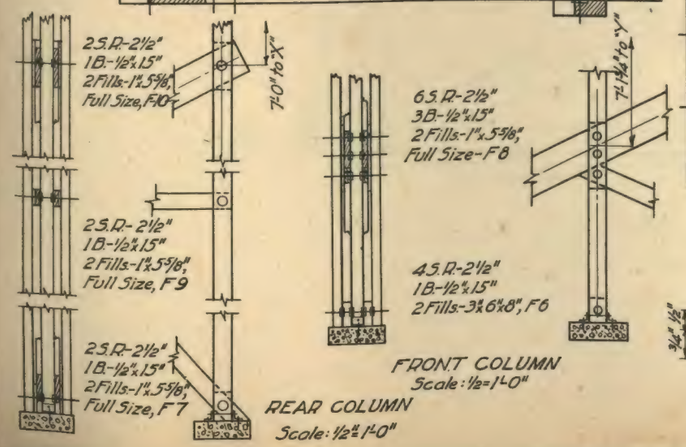
STRESS DIAGRAM
Scale: 1"=5000#



SECTION A-A



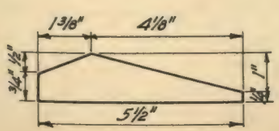




REAR COLUMN
Scale: 1/2"=1'-0"

FRONT COLUMN
Scale: 1/2"=1'-0"

COLUMN SPLICE



NAILING STRIP
Half Size

Lumber Cutting Bill- Main Truss Only.

Pc. Mk.	Size	Length	Make	Cut from	Order	Pc. Mk.	Size	Length	Make	Cut from	Order
Decking	2"x6"				590	L-1, L-3	3"x4"	12'-0"	2	12'	2
Purlins	3"x10"	18'-0"	1	18'	1	L-2, L-5	3"x4"	15'-3"	2	16'	2
Purlins	3"x10"	18'-0"	3	18'	3	F-1	4"x4"	11'-0"	1	D-1	0
B-1	4"x4"	0'-10"	4	12'	1	F-2	3"x4"	0'-6"	2	D-1	0
V-1	4"x4"	3'-4"	1	B-1	0	F-2	4"x4"	0'-6"	1	8'	1
V-3	4"x4"	4'-0"	1	B-1	0	F-3	4"x4"	0'-0"	1	F-2	0
V-3	2"x4"	4'-0"	2	8'	1	F-4	4"x4"	1'-3"	1	F-2	0
V-4	4"x4"	2'-9"	1	B-1	0	F-5	3"x6"	3'-0"	2	10'	1
P-1	4"x6"	11'-6"	1	14'	1	F-6	3"x6"	0'-8"	2	P-2	0
P-1	3"x6"	11'-0"	2	12'	2	F-7	3/4"x6"	0'-9"	2	F-8	0
P-2	4"x6"	11'-10"	1	12'	1	F-8	3/4"x6"	1'-9"	2	10'	1
P-2	3"x6"	12'-10"	2	16'	2	F-9	3/4"x6"	0'-6"	2	F-8	0
P-3	4"x6"	20'-9"	1	22'	1	F-10	3/4"x6"	1'-3"	2	F-8	0
P-3	3"x6"	19'-7"	2	20'	2	Nail Strip	2"x6"	18'-0"	1	18'	1
WB-1	3"x4"	7'-9"	2	10'	2	Spl. Pl. 1	3/8"x6"	1'-6"	2	F-3	0
D-1	3"x4"	6'-3"	2	14'	1	Spl. Pl. 2	4"x8"	2'-4 1/8"	1	P-1	0
D-2	3"x4"	6'-4"	2	14'	1	Spl. Pl. 2	3"x6"	1'-1"	2	P-2	0
D-3	3"x4"	6'-4"	2	10'	2	Spl. Pl. 3	4"x4"	1'-9"	1	F-2	0
U-1, U-2	3"x4"	11'-0"	2	12'	2	Spl. Pl. 4	3"x8"	0'-8"	2	P-1	0
U-3, U-5	3"x4"	17'-2"	2	18'	2	Spl. Pl. 5	3"x4"	2'-3"	2	D-3	0

Lumber Cutting Bill— Bracing Trusses

Pc. Mk.	Size	Length	Make	Cut from	Order	Pc. Mk.	Size	Length	Make	Cut from	Order
A	2"x4"	18'-0"	2	18'	2	H	2"x4"	18'-0"	2	18'	2
B	2"x4"	18'-0"	2	18'	2	I	2"x4"	18'-0"	2	18'	2
C	2"x4"	8'-0"	1	18'	1	J	2"x4"	11'-9"	1	12'	1
D	4"x6"	19'-7"	1	20'	1	K	2"x4"	11'-9"	1	12'	1
E	2"x4"	8'-6"	1	C	0	L	4"x6"	4'-0"	1	12'	1
F	4"x6"	19'-7"	1	20'	1	M	2"x4"	11'-9"	1	12'	1
G	2"x4"	8'-6"	1	10'	1	N	2"x4"	11'-9"	1	12'	1
Spl.	4"x8"	2'-0"	2	L	0	Spl.	4"x8"	2'-0"	2	L	0

Total Lumber Footage
1258 Ft. B.M. No Roof Decking.

Hardware

No.	Item	Size	No.	Item	Size
118	Split Rings	2 1/2"	2	Bolts	1/2"x22"
18	" "	4"	4	"	3/4"x10"
6	Bolts	1/2"x9"	5	"	3/4"x18"
34	"	1/2"x10"	1	"	3/4"x22"
19	"	1/2"x15"	114	Plate Washers	2"x2"x1/8"
2	"	1/2"x20"	20	" "	3"x3"x3/16"

Typical design for use of Architects and Engineers

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

GRANDSTAND ROOF

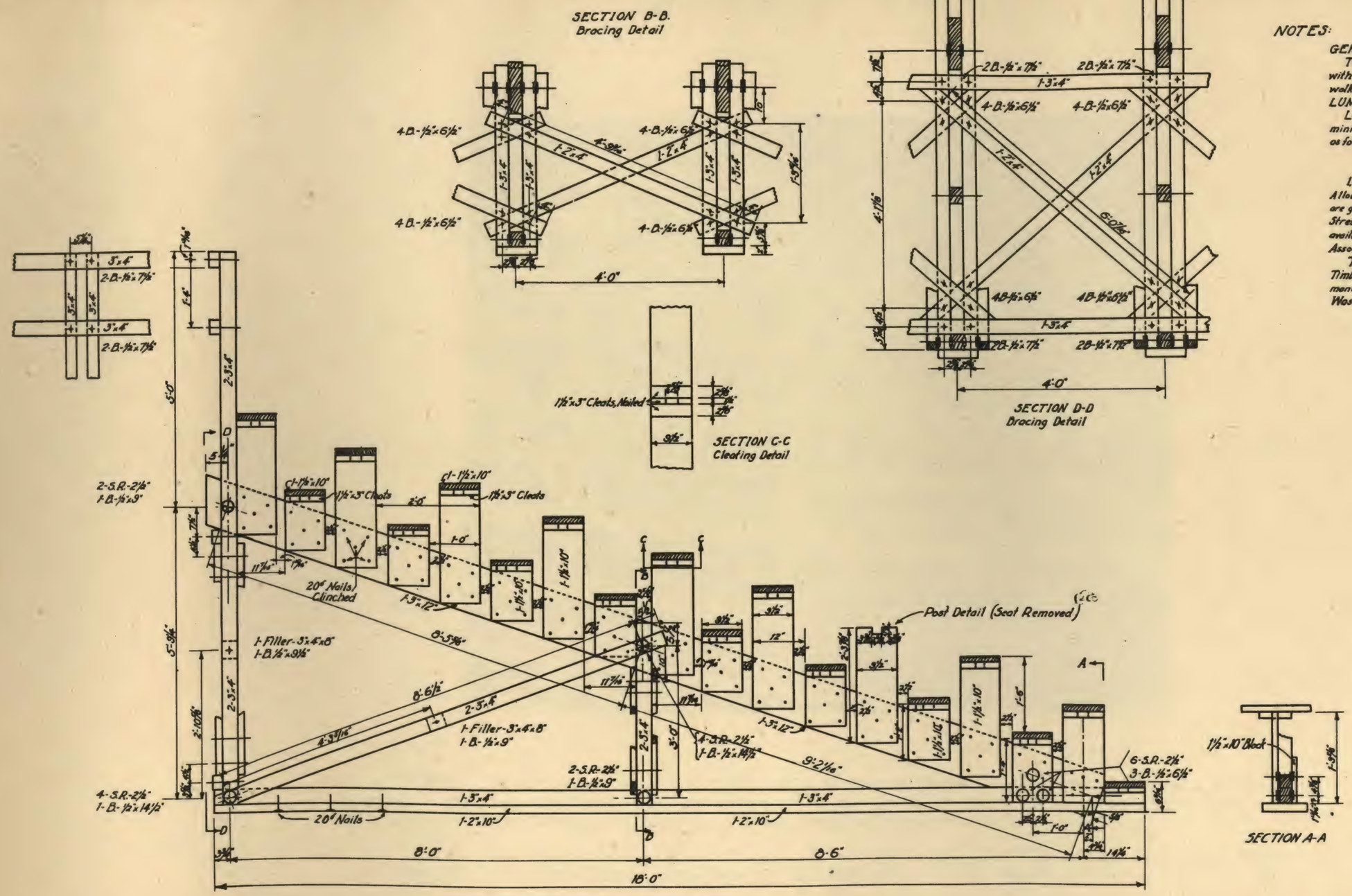
SCALE 1/2"=1'-0" & as noted | SHEET 1 OF 1

DATE | DRAWING NO.

DESIGNED BY J. GARR 5/20/37
CHECKED BY F.R.C.
TRACED BY W. ADAM 2/15/38

109A

Rev. N.M.- 10/27/39. J.H.C.



NOTES:

GENERAL

This grandstand is to be built in 18'-0" sections with 4-4'-0" bays and a 1'-0" overhang of seats and walks on each end.

LUMBER.

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of Elasticity.

Allowable unit working stresses for commercial grades are given in the attached N.L.M.A. leaflet "Working Stresses for Structural Lumber and Timber," or are available from Regional Lumber Manufacturers Associations.

TIMBER CONNECTORS

Timber connectors shall be TECO Split Rings as manufactured by the Timber Engineering Company, Washington, D.C.

MATERIALS LIST PER SECTION.

LUMBER (S4S).

13	Pieces	1½"x3"x12'-0"	59 Ft. B.M.
5	"	1½"x10"x14'-0"	88 "
23	"	1½"x10"x18'-0"	518 "
4	"	2"x4"x12'-0"	32 "
4	"	2"x4"x14'-0"	38 "
5	"	2"x10"x18'-0"	150 "
10	"	3"x4"x12'-0"	120 "
10	"	3"x4"x14'-0"	140 "
9	"	3"x4"x18'-0"	162 "
5	"	3"x12"x18'-0"	270 "

Total=1577 Ft. B.M.

HARDWARE

90	TECO Split Rings	2½"ø
95	Machine Bolts	½"x6½"
40	" "	½"x7½"
10	" "	½"x9"
10	" "	½"x14½"
310	Plate Washers	2"x2"x⅛"
555	Nails	20d
540	"	8d

Typical design for use of Engineers and Architects.

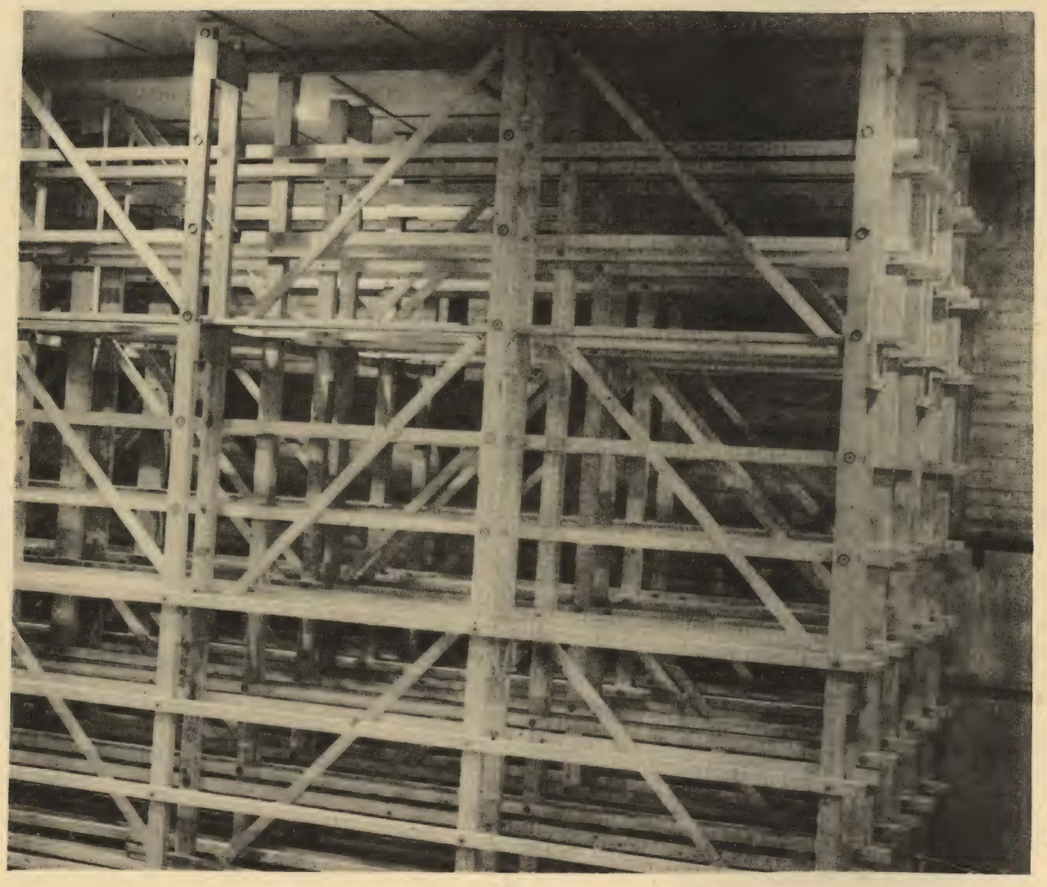
TIMBER, ENGINEERING COMPANY
WASHINGTON, D. C.

PORTABLE BLEACHERS
18'-0" Sections Capacity 108

SCALE 1"=1'-0" SHEET 1 OF 1
TRACED BY W. ADAM. DATE 12/4/36
DESIGNED BY CARR 11/9/36
CHECKED BY R. LANDSEM. 12/4/36
DRAWING NO. 43

Rev. N.M. 10/27/39 J.H.C.

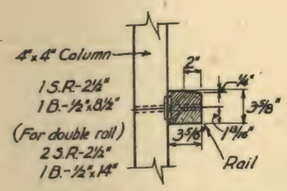
DISTILLERY RACKS



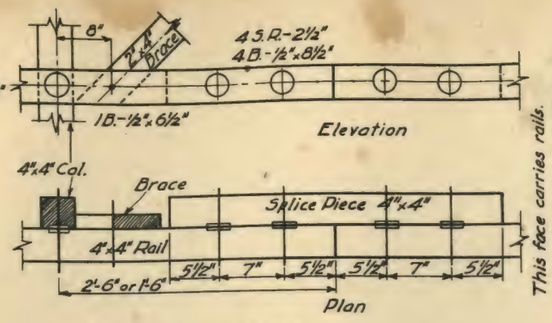
USES: Distillery racks are primarily employed for the storage of barrels in warehouses. The use of the racks, of course, is not limited to distilleries since they are adaptable to the storage of barrels of many types regardless of contents.

One of the chief reasons for the use of wooden racks for this purpose is the fact that wood is not unfavorably affected by the contents of the barrel.

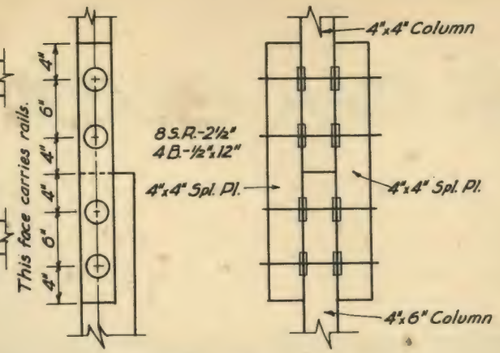
The racks may be built in various heights and are also very flexible as to layout. Racks similar to those shown have been standard with several large distilleries for some time.



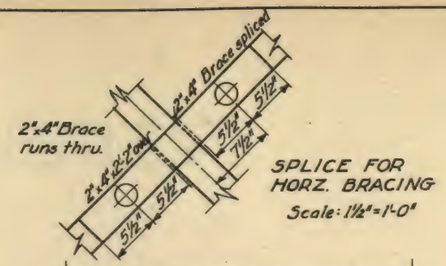
RAIL SUPPORT
Scale: 1½"=1'-0"



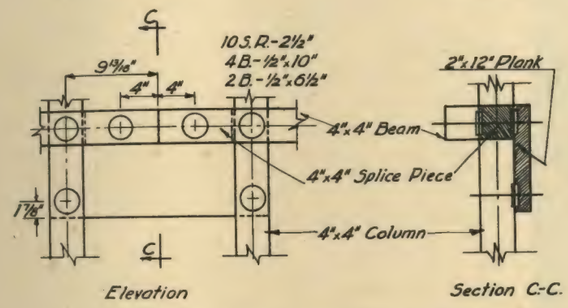
RAIL SPLICE
Scale: 1½"=1'-0"



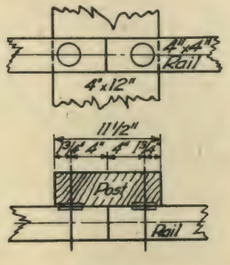
SAMPLE COLUMN SPLICE
Scale: 1½"=1'-0"



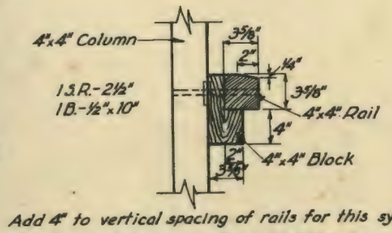
SPLICE FOR HORZ. BRACING
Scale: 1½"=1'-0"



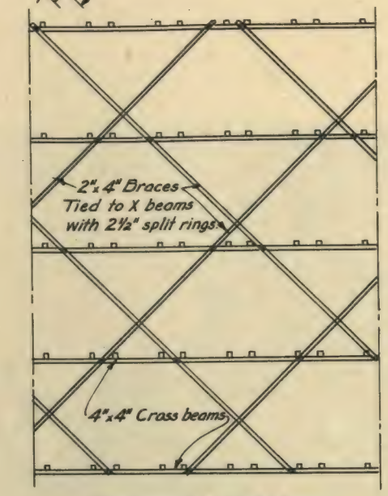
BEAM SPLICE UNDER CATWALK
Scale: 1½"=1'-0"



ALTERNATE RAIL SPLICE
Scale: 1½"=1'-0"



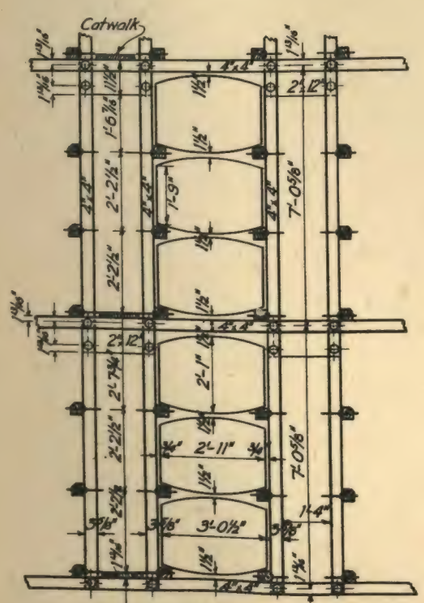
Add 4" to vertical spacing of rails for this system.
ALTERNATE RAIL SUPPORT
(for better access to barrel heads)
Scale: 1½"=1'-0"



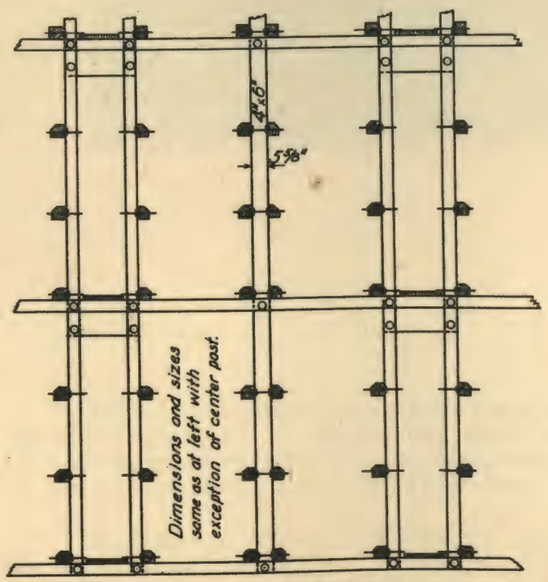
HORIZONTAL BRACING
AT TOP OF RACK
Scale: 3/16"=1'-0"

MAXIMUM ALLOWABLE SPANS FOR RAILS						
Computations are for American Lumber Standard Sizes (S4S).						
Nominal Size	Fiber Stress in #/sq.in. (f).					
	1000	1100	1200	1400	1600	1800
4"x4"	6'-10"	7'-2"	7'-5"	8'-0"	8'-7"	9'-1"
4"x6"	10'-10"	11'-3"	11'-8"	12'-8"	13'-6"	14'-4"

TABLE OF COLUMN SIZES FOR VARIOUS NO. OF TIERS.		
No. of barrels in height.	Barrels on one side of col. only.	Barrels on both sides of cols.
3	4"x4"	4"x4"
6	4"x4"	4"x6"
9	4"x6"	6"x6"
12	4"x6"	6"x8"
Columns must be of an 880#C grade or better.		

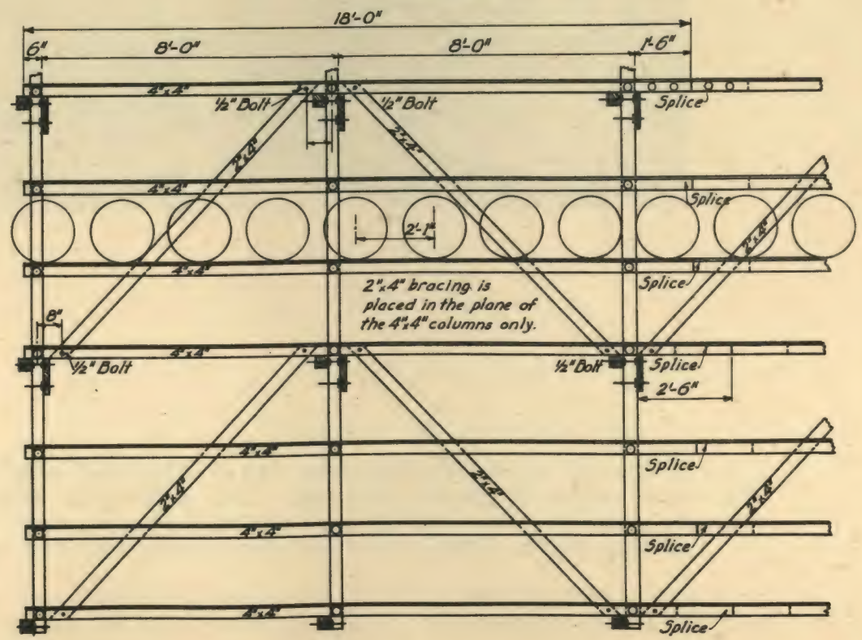


SINGLE RACK



DOUBLE RACK

CROSS SECTION OF RACK UNIT
Scale: ½"=1'-0"



LONGITUDINAL SECTION OF RACK UNIT
Scale: ½"=1'-0"
0 1 2 3 4
Scale in Feet

NOTES:

All connections shall be made with 2½" Split Rings, as manufactured by the Timber Engineering Company, Wash., D.C., and ½" bolts, except for attaching diagonal braces which employ ½" bolts only.

Toothed Rings, 2⅝"Φ, may be substituted for 2½" Split Rings.

Lumber shall be of a structural grade, dressed (S4S). See tables above for stress grades for rails and columns. Anchor sills to floor where necessary.

Typical design for use of Engineers and Architects.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

BARREL RACK DESIGN

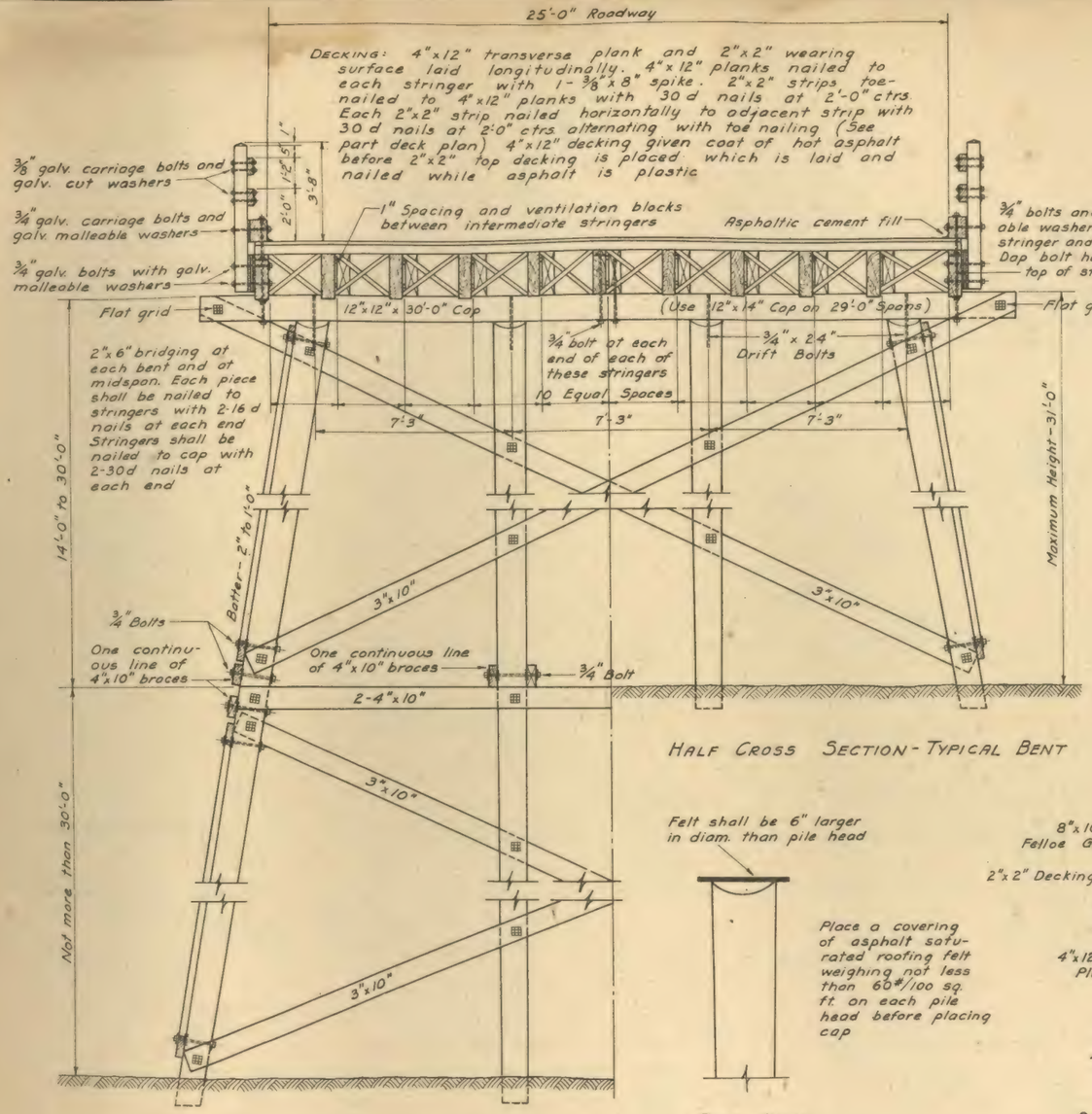
SCALE As noted	SHEET 1 OF 1	
TRACED BY W. ADAM DATE 5/6/37		DRAWING NO.
DESIGNED BY R.L., F.P.C., & J.C. 4/16/37		217
CHECKED BY		

Addition 12/17/37
Rev. N.M.- 10/27/39- J.H.C.

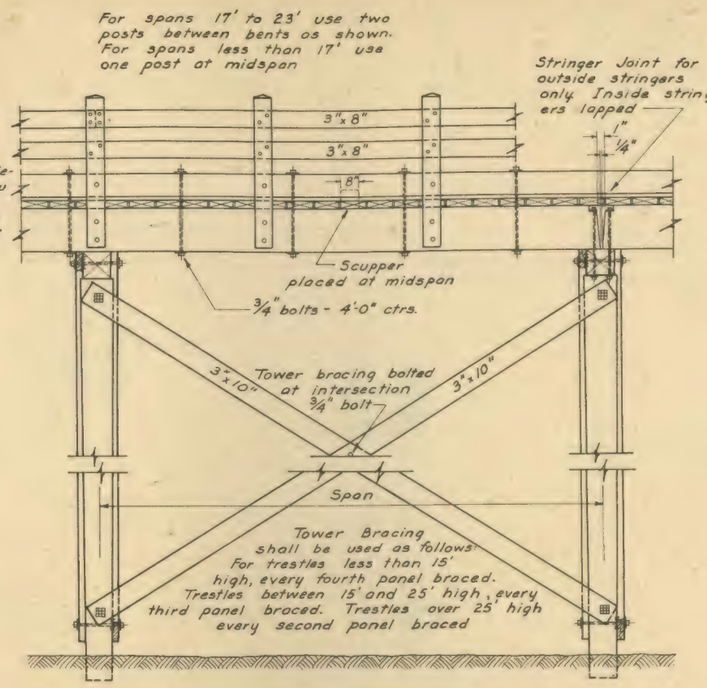
BRIDGES AND TRESTLES

USES: Bridges and trestles in timber are practical and advisable up to spans of two hundred feet. While the main arterial highways call for all types of materials, it is the secondary and the farm-to-market roads where timber is particularly useful because it is economical, more locally available and its use provides more local employment.

Choice of type of truss is largely dependent upon local ground conditions. One of the most popular types is the Pony type shown in the photograph. This type provides low cost carrying capacity and has a good appearance.



HALF CROSS SECTION - TYPICAL BENT



ELEVATION
Scale: 3/8" = 1'-0"

Symbol — 1-Single curve spike grid - 4 1/8" x 4 1/8" and 1-3/4" bolt (unless noted)

NOTES AND SPECIFICATIONS

LUMBER

All lumber except piling shall be S4S. Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. inch as follows:

880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of Elasticity

TREATMENT

All timber except rails and wheel guards shall be treated after fabrication by the empty cell process to an average retention of 8#/cu. ft with No. 1 creosote oil. Rails and wheel guards shall be painted with two coats of white lead

CONNECTORS AND HARDWARE

Connectors shall be split rings and spike grids as manufactured by the Timber Engineering Co., Wash., D.C.

Unless noted, all bolts shall be 3/4" machine bolts with square heads and nuts. All bolts shall be fitted with a cast iron, O.G. or malleable iron washer at each end unless noted otherwise

GENERAL

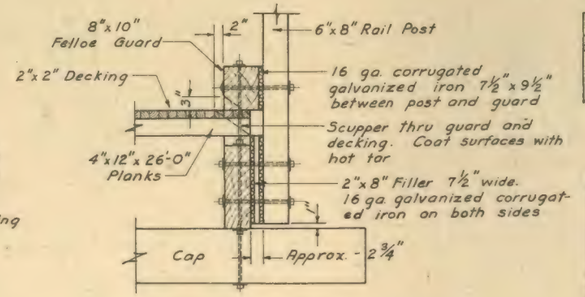
Holes for drift bolts shall be bored 1/16" less than the diameter of the bolt.

Stringers shall be sized at bearing points so as to secure a crown of 1 1/2" and the decking pieces shall be sprung to contact

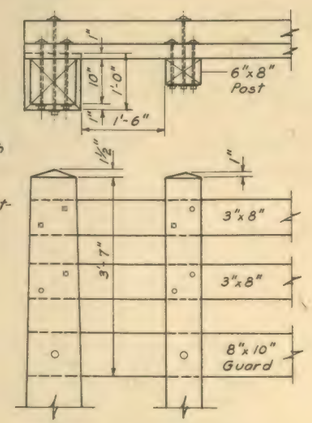
All hardware to be galvanized shall be done according to A.S.T.M. Standard Specifications for galvanizing: A-123-33. All workmanship and material shall conform to the Standard Specifications for Highway Bridges - 1935 Edition - American Association of State Highway Officials

HALF CROSS SECTION - HIGH BENT
Scale: 3/8" = 1'-0"

PILE HEAD PROTECTION
Scale: 3/4" = 1'-0"

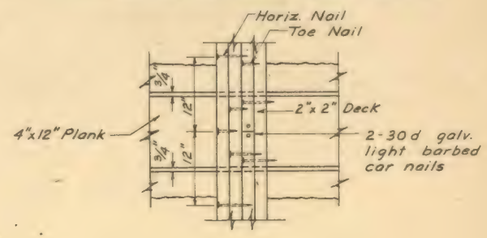


DETAIL OF GUARD AND RAIL POST
Scale: 3/4" = 1'-0"

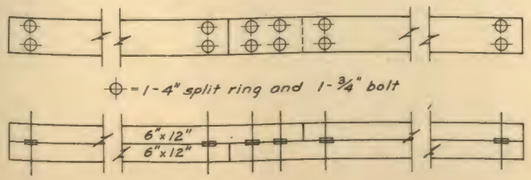


END POST DETAIL
Scale: 3/4" = 1'-0"

Where joints occur in 2"x2" strips, nail at joints as shown and space 2 toe nails and 2 horizontal nails on both sides of joint at about 6" ctrs. before resuming regular 12" alternate spacing

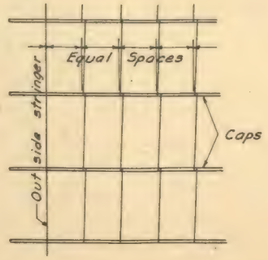


PART DECK PLAN
Scale: 1" = 1'-0"

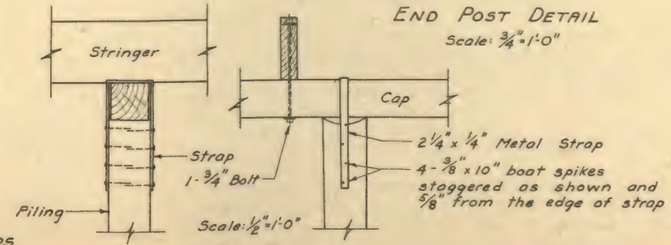


SPLIT CAP DETAIL — Alternate for solid cap
Scale: 1/2" = 1'-0"

Stringer Table		
Span	No.	Size
13'-0"	11	6"x16"
15'-0"	11	6"x16"
17'-0"	11	6"x18"
19'-0"	11	6"x18"
21'-0"	11	6"x20"
23'-0"	11	6"x20"
25'-0"	11	6"x22"
27'-0"	11	6"x22"
29'-0"	11	6"x24"



METHOD OF LAYING STRINGERS

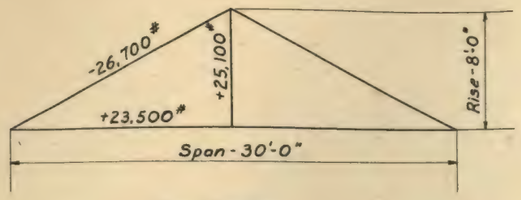


DETAIL FOR TRESTLES SUBJECT TO OVERFLOW

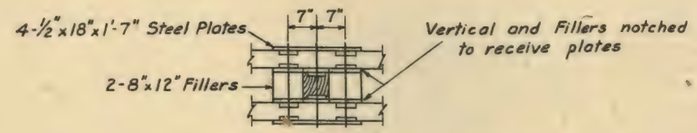
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

TIMBER HIGHWAY TRESTLE
H-15 LOADING

SCALE As shown	SHEET 1 OF 1	
DESIGNED BY D.S.H.	DATE 8/28/40	DRAWING NO.
CHECKED BY J.H.C.	8/30/40	325
TRACED BY D.S.H.	9/3/40	



Line Diagram

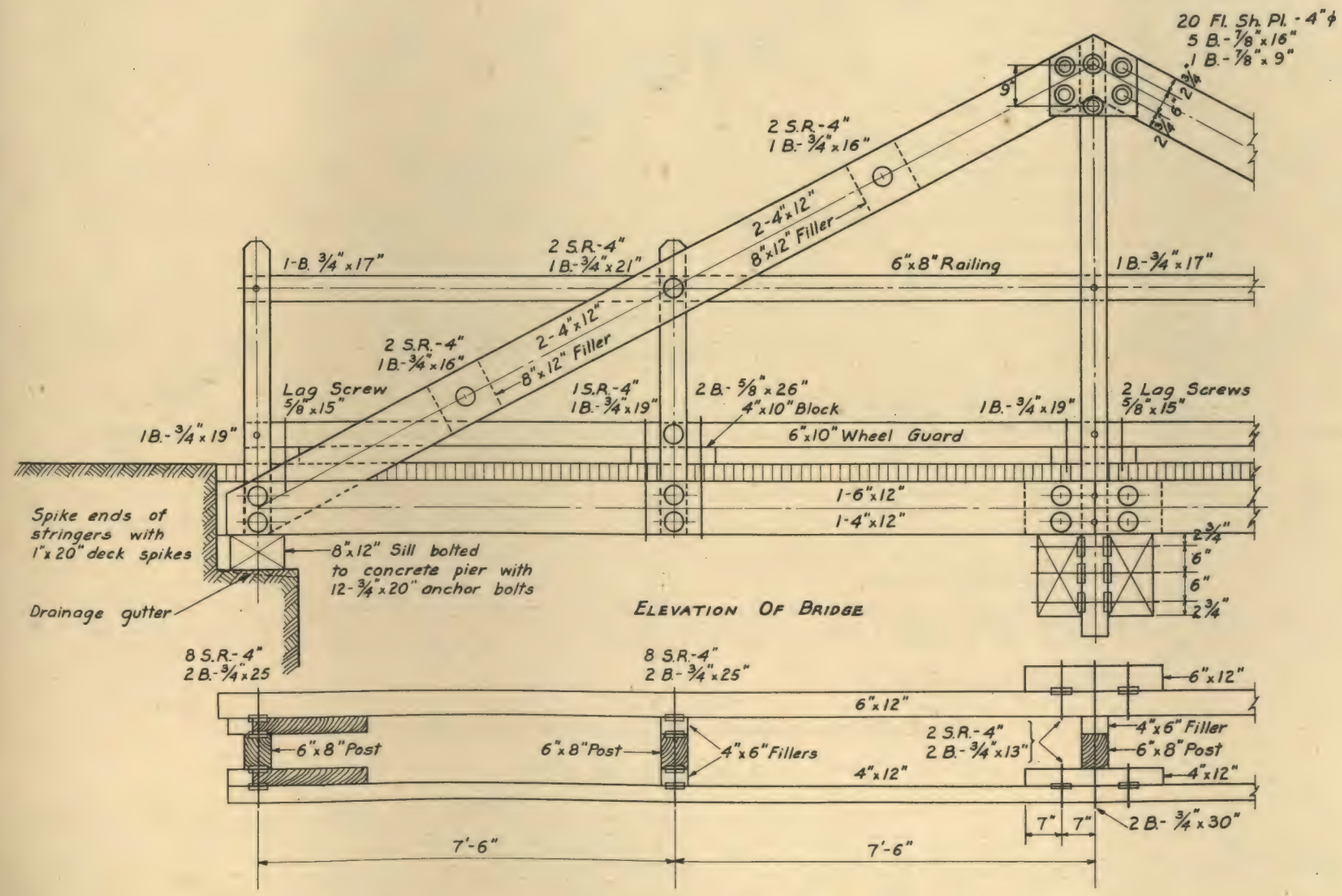


Lumber (S4S)

Sills	2-8"x12"x 22'-0"	352	F.B.M.
Floor Beams	2-10"x18"x 22'-0"	660	"
Posts	4-6"x8"x 16'-0"	256	"
Stringers	18-6"x12"x 18'-0"	1944	"
Drainage Blocks	1-4"x10"x 14'-0"	47	"
Wheel Guards	4-6"x10"x 16'-0"	320	"
Rails	4-6"x8"x 16'-0"	256	"
Lam. Deck	230-2"x4"x 20'-0"	3067	"
Top Chord	8-4"x12"x 18'-0"	576	"
Top Chord Fillers	1-8"x12"x 10'-0"	80	"
Bottom Chord	4-6"x12"x 16'-0"	384	"
	2-4"x12"x 16'-0"	128	"
	2-4"x12"x 18'-0"	144	"
Fillers & Splices in Bottom Chord	1-4"x 6"x 10'-0"	20	"
	1-6"x12"x 6'-0"	36	"
	Total =	8270	F.B.M.

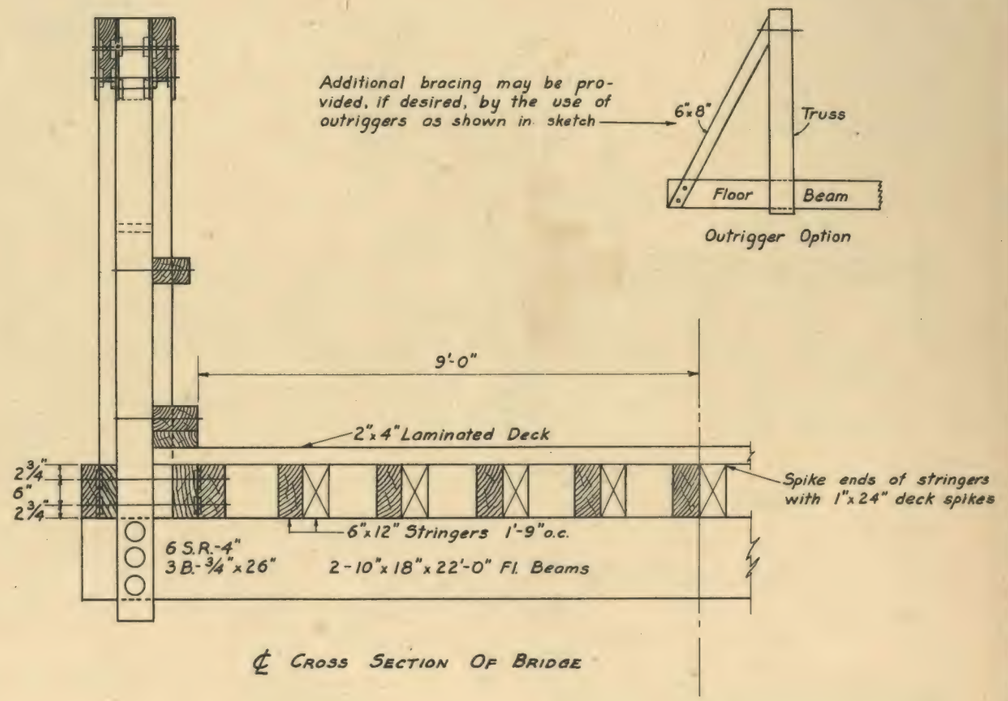
Hardware

108	Split Rings	4" ϕ
40	Shear Plates	4" ϕ
8	Machine Bolts	5/8"x 26"
16	" "	3/4"x 13"
8	" "	3/4"x 16"
6	" "	3/4"x 17"
10	" "	3/4"x 19"
16	" "	3/4"x 25"
6	" "	3/4"x 26"
4	" "	3/4"x 30"
2	" "	7/8"x 9"
10	" "	7/8"x 16"
8	Lag Screws	5/8"x 15"
24	Anchor Bolts	3/4"x 20"
24	Wrought Iron Washers for 5/8" bolts	
156	" " " " 3/4" "	
8	Steel Plates	1/2"x 18"x 1'-7"



Elevation Of Bridge

Plan Of Bottom Chord



℄ Cross Section Of Bridge

Additional bracing may be provided, if desired, by the use of outriggers as shown in sketch

Outrigger Option

Lumber

Lumber shall be of a dense structural grade with minimum allowable working stresses in lbs. per. sq. in. as follows:

1200# Compression parallel to grain
1600# Extreme fiber in bending
1,600,000# Modulus of Elasticity

Treatment

All timber, except rails and wheel guards, shall be treated after fabrication by the empty cell process to an average retention of 8#/cu. ft. with No. 1 creosote oil. Rails and wheel guards shall be painted with two coats of white lead.

Timber Connectors

Connectors shall be split rings and flanged shear plates as manufactured by the Timber Engineering Co., Wash., D.C.

Specifications

All hardware shall be galvanized according to A.S.T.M. Standard Specifications for galvanizing A-123-33. All workmanship and material shall conform to the Standard Specifications for Highway Bridges - 1935 Edition - American Association of State Highway Officials

30'-0" Span King Post Timber Bridge

18'-0" Roadway H-10 Loading

Scale: 3/4" = 1'-0"

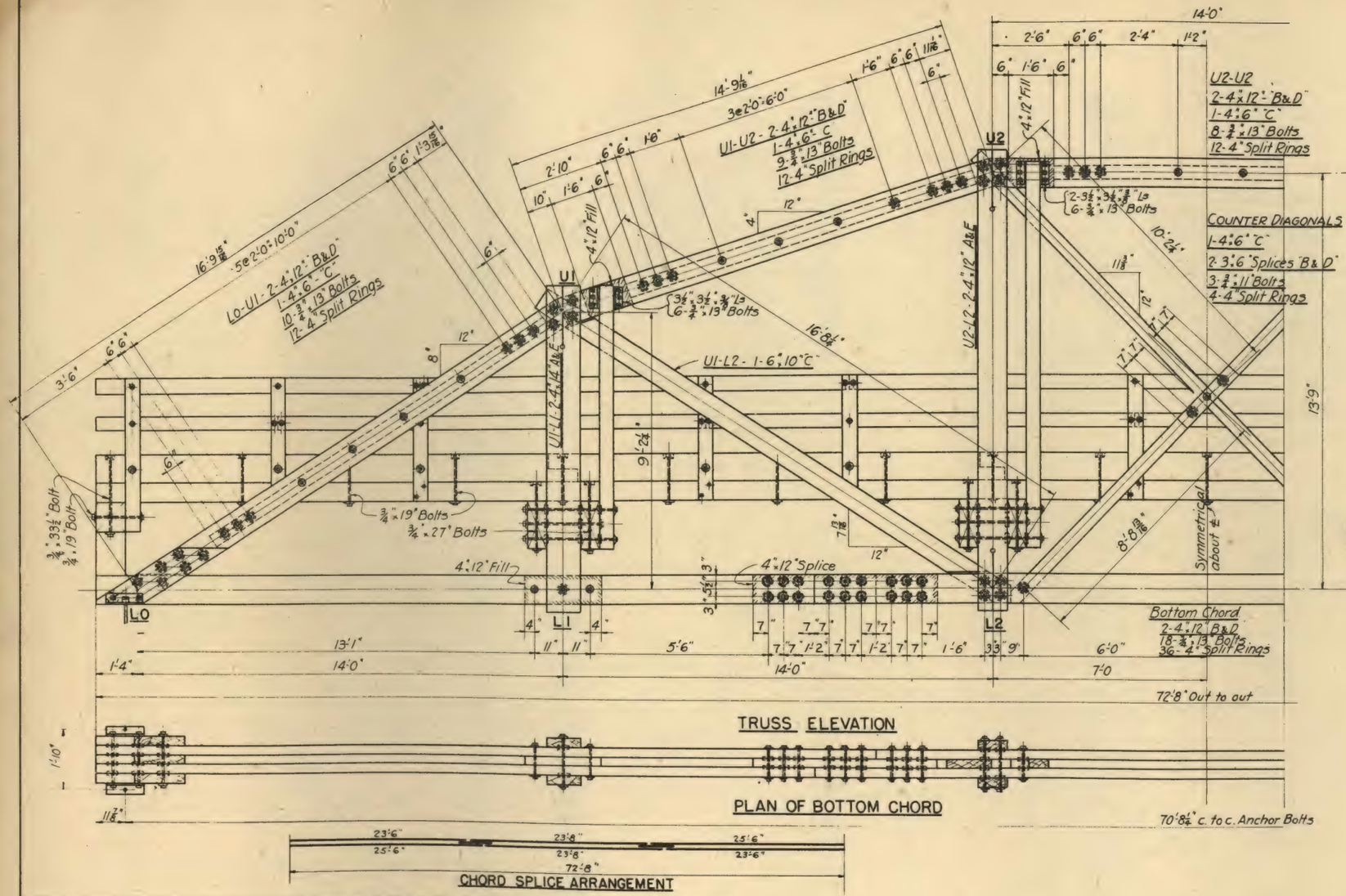
Timber Engineering Company
Washington, D. C.

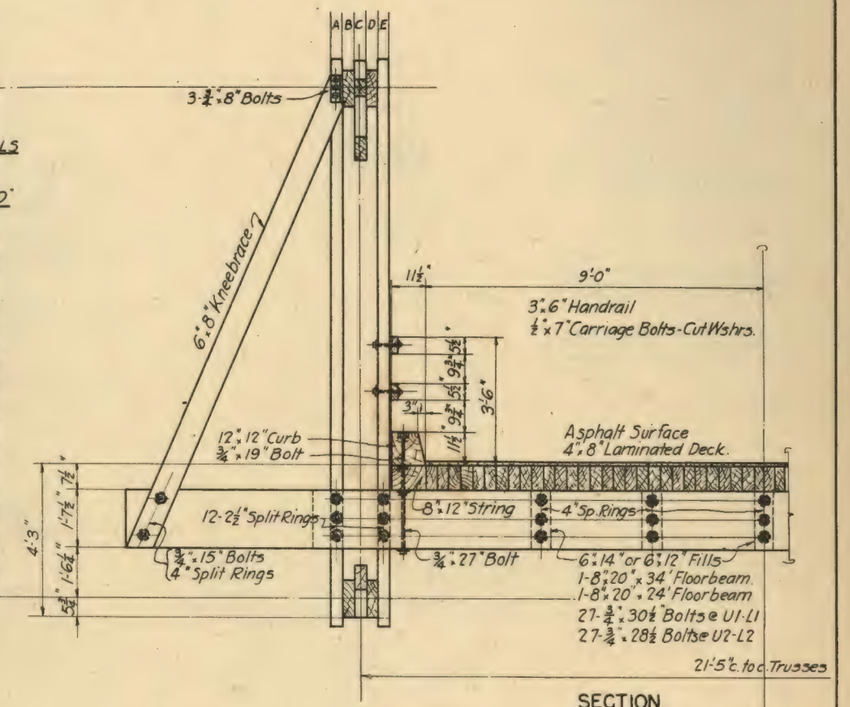
30'-0" King Post Truss
H-10 Loading 18'-0" Roadway

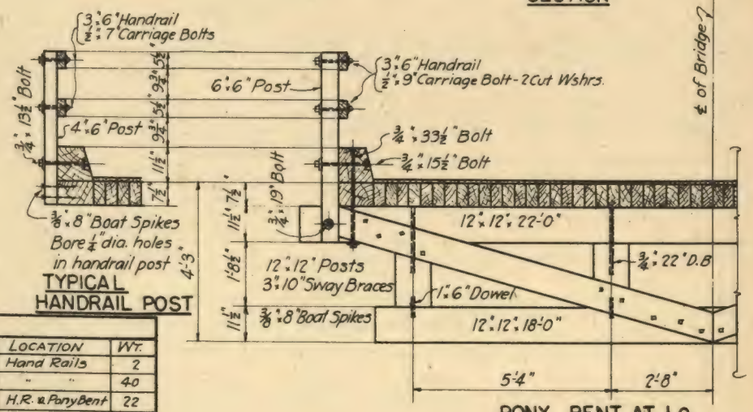
Scale 3/4" = 1'-0" Sheet 1 of 1

	Date	Drawing No.
Designed by L. Wagner	8/39	B-10
Checked by J.H.C. & D.S.H.	10/39	
Traced by J.H.C. & D.S.H.	2/40	

Revised N.M. 2/6/40 J.H.C.







BILL OF LUMBER

Item	No.	Size	Length	Location	F.B.M.	Item	No.	Size	Length	Location	F.B.M.
1	8	4"x12"	18'-0"	L0-U1	576	20	4	4"x12"	2'-6"	Joint L1	40
2	4	4"x6"	14'-0"	L0-U1	112	21	4	8"x20"	24'-0"	Floorbeams	1280
3	8	4"x12"	16'-0"	U1-U2	512	22	4	8"x20"	34'-0"	"	1813
4	4	4"x6"	12'-0"	U1-U2	96	23	4	8"x12"	16'-0"	String Pieces	512
5	4	4"x12"	1'-6"	U1-U2 Fills	24	24	6	8"x12"	14'-0"	String Pieces	672
6	4	4"x12"	16'-0"	U2-U2	256	25	10	12"x12"	16'-0"	Curbs	1920
7	2	4"x6"	10'-0"	U2-U2	40	26	40	4"x8"	6'-0"	Laminated Deck	640
8	4	4"x12"	1'-6"	U2-U2 Fills	24	27	40	4"x8"	12'-0"	" "	1280
9	8	4"x12"	24'-0"	Bottom Chord	768	28	220	4"x8"	14'-0"	" "	8213
10	4	4"x12"	26'-0"	" "	416	29	40	4"x8"	16'-0"	" "	707
11	4	4"x12"	7'-0"	" " Splice	96	30	8	3"x6"	16'-0"	Hand Rail	192
12	4	6"x10"	20'-0"	U1-L2	400	31	12	3"x6"	14'-0"	" "	252
13	4	4"x6"	22'-0"	Counter Diagonals	176	32	20	4"x6"	5'-0"	" " Posts	200
14	4	3"x6"	3'-0"	" " Splices	18	33	4	6"x6"	8'-0"	" " "	96
15	8	4"x14"	12'-0"	U1-L1	448	34	2	12"x12"	22'-0"	Pony Bent Caps	528
16	8	4"x12"	16'-0"	U2-L2	512	35	2	12"x12"	18'-0"	" " Sills	432
17	4	6"x8"	14'-0"	Knee Braces	224	36	8	12"x12"	2'-0"	" " Posts	192
18	4	6"x8"	12'-0"	" "	192	37	4	3"x10"	12'-0"	" " Braces	120
19	12	4"x12"	9'-0"	Joint L0	432	38	2	6"x14" / 6"x12"	16'-0" / 10'-0"	Floorbeam Fills	148 / 120

TOTAL FBM 24671

BILL OF IRON

Item	No.	Size	Length	Description	Location	Weight	Item	No.	Size	Length	Description	Location	Wt.
1	504	4"		Teco Split Rings			17	4	1/2"	9"	Carriage Bolts	Hand Rails	2
2	248	2 1/2"		" " "			18	80	1/2"	7"	" "	" "	40
3	8	5"x3 1/2"x5/8"	1'-3"	Angles	Joint L0	116	19	60	5/8"	8"	Boat Spikes	H.R. & Pony Bent	22
4	16	3 1/2"x3 1/2"x3/8"	0'-9"	"	Knee braces	102	20	8	3/4"	22"	Drift Bolts	Pony Bent	22
5	16	3 1/2"x3/8"	0'-11 1/2"	Plates	Joints U1 & U2	22	21	8	1"	6"	Dowels	" "	13
6	24	3/4"	8"	Machine Bolts	Knee Braces	33	22			8"	Wire Spikes	Lam. Deck	400
7	224	"	13	" "		448	23	168	1/2"		Cut Washers		20
8	20	"	13 1/2"	" "		41	24	1084	3/4"		C.I. Mal. Wshrs		407
9	16	"	15"	" "		36							
10	4	"	15 1/2"	" "		9					TOTAL WEIGHT		2597
11	42	"	19"	" "		114							
12	84	"	20 1/2"	" "		244							
13	16	"	27"	" "		59							
14	54	"	28 1/2"	" "		208							
15	54	"	30 1/2"	" "		221							
16	4	"	33 1/2"	" "		18							

Note: Lumber to be select struc. Douglas Fir or Structural Square Edge & Sound, Southern Yellow Pine.

For details of truss joints see sheet 2.

TIMBER ENGINEERING COMPANY
WASHINGTON, D.C.

70'-0" PONY TRUSS

H-10 LOADING 18'-0" ROADWAY

SCALE 1/2" = 1'-0" SHEET 1 OF 2

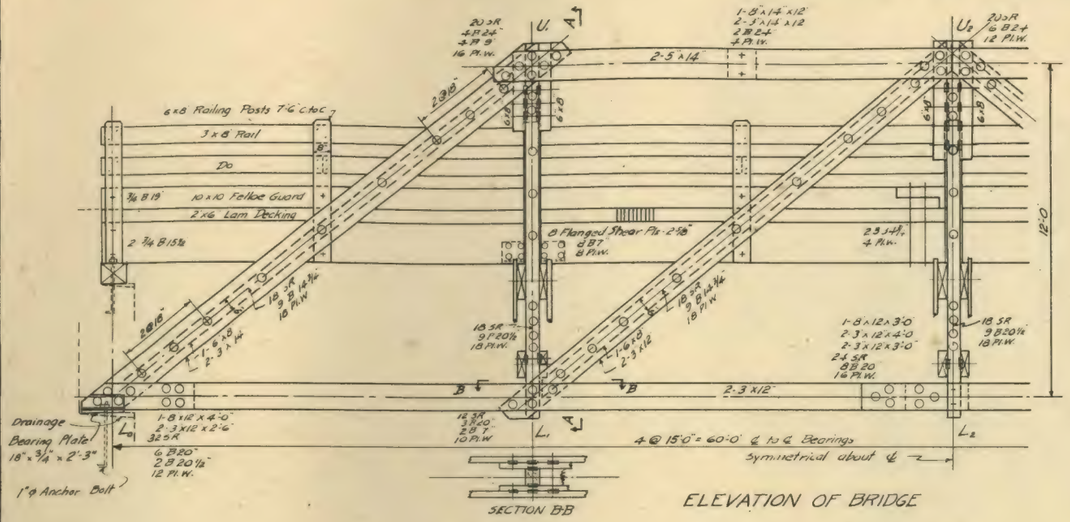
DATE

DESIGNED BY W.D. Smith 8/39
CHECKED BY J.H.C. & D.S.H. 10/39
TRACED BY W.A. Smith 8/39

DRAWING NO. B-1

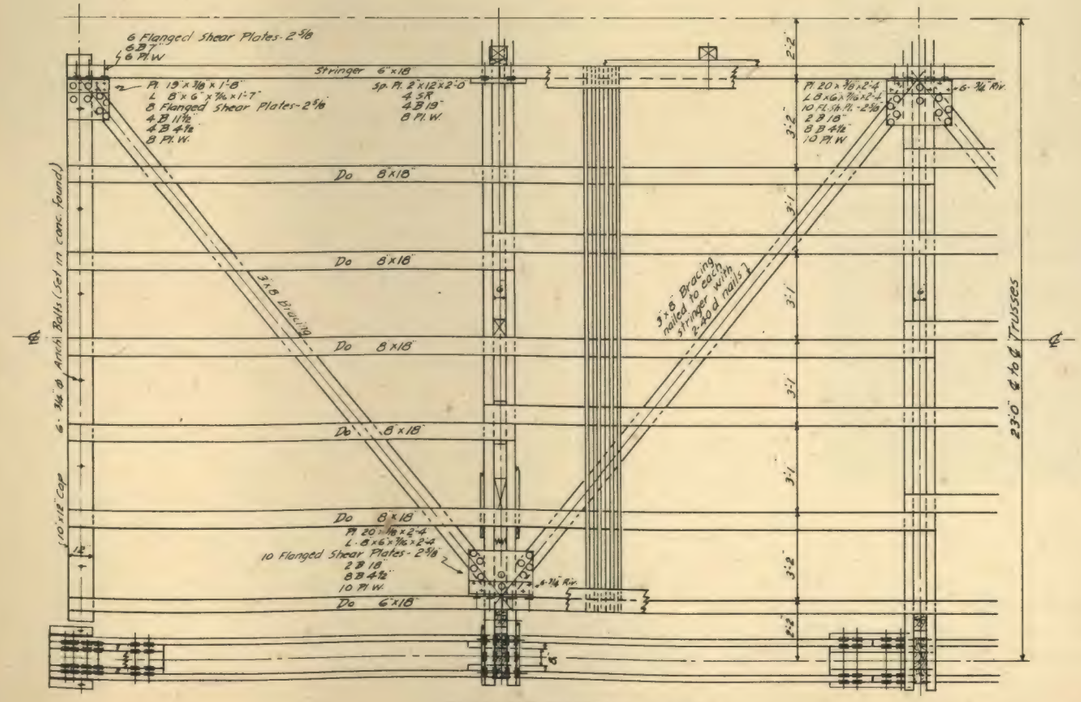
Revised N.M. 12/6/39 J.H.C.

PLAN OF TOP CHORD



SECTION B-B

ELEVATION OF BRIDGE

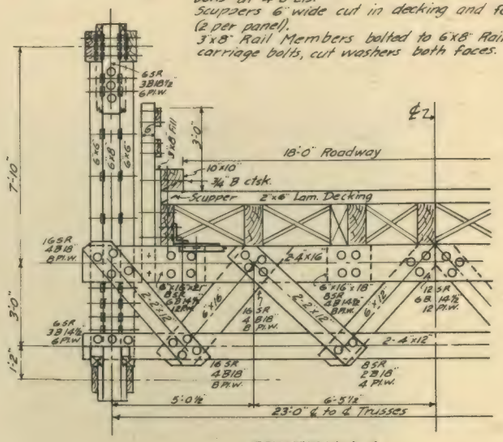


PLAN OF BOTTOM CHORD

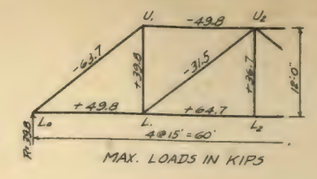
60 FT. TIMBER HIGHWAY BRIDGE
H-15 LOADING - 18'-0" ROADWAY

Scale 3/8" = 1'-0"

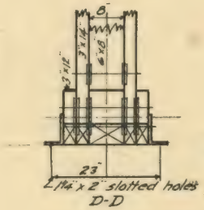
2"x6" laminated decking. Each 2"x6" nailed horizontally to adjacent piece twice between each pair of stringers with 30d nails. Each 2"x6" to be nailed to every alternate stringer with 20d nails. Alternate pieces of decking to be nailed to alternate stringers.
2"x6" bridging at panel points and at mid-panels. Each 2"x6" nailed to stringers with 4-16d nails. Each stringer nailed to floor beam and cap with 4-30d. nails.
10"x10" Fellce Guard fastened through stringer with 3/4" bolts at 4'-0" cts.
Scuppers 6" wide cut in decking and fellce guard (2 per panel).
3"x8" Rail Members bolted to 6"x8" Rail Post with 3/8" carriage bolts, cut washers both faces.



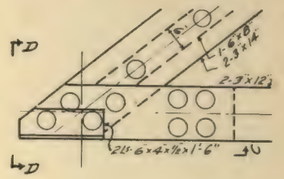
SECTION A-A



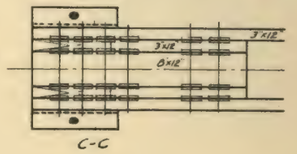
MAX. LOADS IN KIPS



D-D



DETAIL OF L0



C-C

BILL OF LUMBER

No. of Pcs.	Size In. (Nom'l)	Length Ft.-In.	Location	Grade
			Trusses	
4	5x14	32-9 1/2	U0U1	1600# f
4	8x14	1-0	"	1200# c
8	3x14	1-0	"	"
8	3x14	21-10	L0U1	1600# f
4	6x8	18-0	"	1600# f
8	3x12	20-9	L1U2	"
4	6x8	18-9	"	"
4	3x12	29-6	L0L2	1600# f
4	3x12	32-11	"	"
4	8x12	4-0	"	1600# f
8	3x12	2-6	"	1600# f
2	8x12	3-0	"	1600# f
4	3x12	4-0	"	1600# f
4	3x12	3-0	"	"
6	6x8	13-8	L1U1 & L2U2	1600# f
12	6x6	11-0	"	"
8	6x8	3-3	"	"
4	6x8	4-3	"	"
6	4x16	25-2	Floor Beams	1600# f
6	4x12	25-2	"	"
6	6x16	1-9	"	1200# c
6	6x16	1-6	"	"
6	6x16	6-0	"	"
6	6x12	5-10	"	"
24	2x12	6-0	"	1600# f
2	10x12	20-5	Caps	1200# c
8	8x18	31-0	Stringers	1600# f
4	8x18	16-0	"	"
2	6x18	30-0	"	"
4	6x18	15-6	"	"
2	2x12	2-0	"	1600# f
4	3x8	23-0	Bracing	1200#
325 lin.ft.	2x6	Random	Cross Bridging	880# c
451	2x6	19-7	Lam. Decking	1600# f
2	10x10	30-0	Fellce Guard	1200# c
2	10x10	32-6	"	"
6	6x8	6-6	Guard-Rail Posts	"
12	6x8	5-2	"	"
18	3x8	2-11	" -Fills	1200# f
4	3x8	15-6	Guard Rails	1600# f
10	3x8	15-0	"	"
4	3x8	8-0	"	"

HARDWARE LIST

8 Ls 6x4x1/2 x 2'-0"		52 Bolts	3/4" x 20"
4 Pls 9"x1" x 2'-2"		18 "	3/4" x 19"
4 Pls 4"x3/8" x 2'-2"		20 "	3/4" x 18 1/2"
3 Pls 20"x3/8" x 2'-4"		90 "	3/4" x 18"
3 Ls 8"x6"x7/16" x 2'-4"		30 "	3/4" x 15 1/2"
2 Pls 19"x3/8" x 1'-8"		72 "	3/4" x 14 3/4"
2 Ls 8"x6"x7/16" x 1'-7"		96 "	3/4" x 14 1/2"
1184 Teco Split Rings-4"		8 "	3/4" x 11 1/2"
82 Teco Flanged Shear Plates-2 5/8"		24 "	3/4" x 9"
4 Bolts 3/4" x 34 3/4"		44 "	3/4" x 7"
36 " 3/4" x 24"		32 "	3/4" x 4 1/2"
62 " 3/4" x 20 1/2"		982 Plate Washers 3"x3"x3/16"	

GENERAL NOTES

All lumber shall be of a structural grade (S4S) with minimum allowable working stresses in lbs. per sq. in. as follows:
Truss members, floor beams, stringers, laminated deck, guard rails, guard rail posts, fellce guards, and caps.
1600 # f
1200 # c
1,600,000 # E
Bracing and cross bridging
1200 # f
880 # c.
1,600,000 # E

All lumber shall be fabricated before treatment and then pressure treated with creosote by the empty cell process with a retention of not less than 8#/cu. ft.

Joints to be made with 4 inch Teco Split-Ring Connectors and 3/4" bolts, except as noted; material, installation and workmanship to conform to "Manual of Timber Connector Construction" published by the Timber Engineering Company, 1935.
All bolts to be 3/4" dia. machine bolts, square heads and square nuts, unless otherwised noted, and to have 3"x3"x1/16" plate washers at each end.
Structural steel plates, shapes and bolts shall conform to the requirements of the Standard Specification for Steel for Bridges, Designation A7-34, of the American Society for Testing Materials; and rivet steel shall conform to A141-33, A.S.T.M.
The guard railing, including posts, shall be painted three coats of approved white lead and oil paint. Structural steel to be painted shop coat of red lead and 2 field coats of approved paint.

All material and workmanship not specified herein shall conform to the "Standard Specification for Highway Bridges" of the American Association of State Highway Officials - 1935.

For dead load lumber is figured as 60 lbs. per cu.ft.

Bridge to be cambered as follows:
Increase the lengths of top chord members U_1U_2 each by 1/4";
Raise Floor Beam at L_2U_2 - 1/4";
Lower the end caps (10"x12") - 1/4".

TIMBER ENGINEERING COMPANY
WASHINGTON, D.C.

60'-0" HOWE TRUSS
H-15 LOADING 18'-0" ROADWAY

SCALE 3/8" = 1'-0" SHEET 1 OF 1

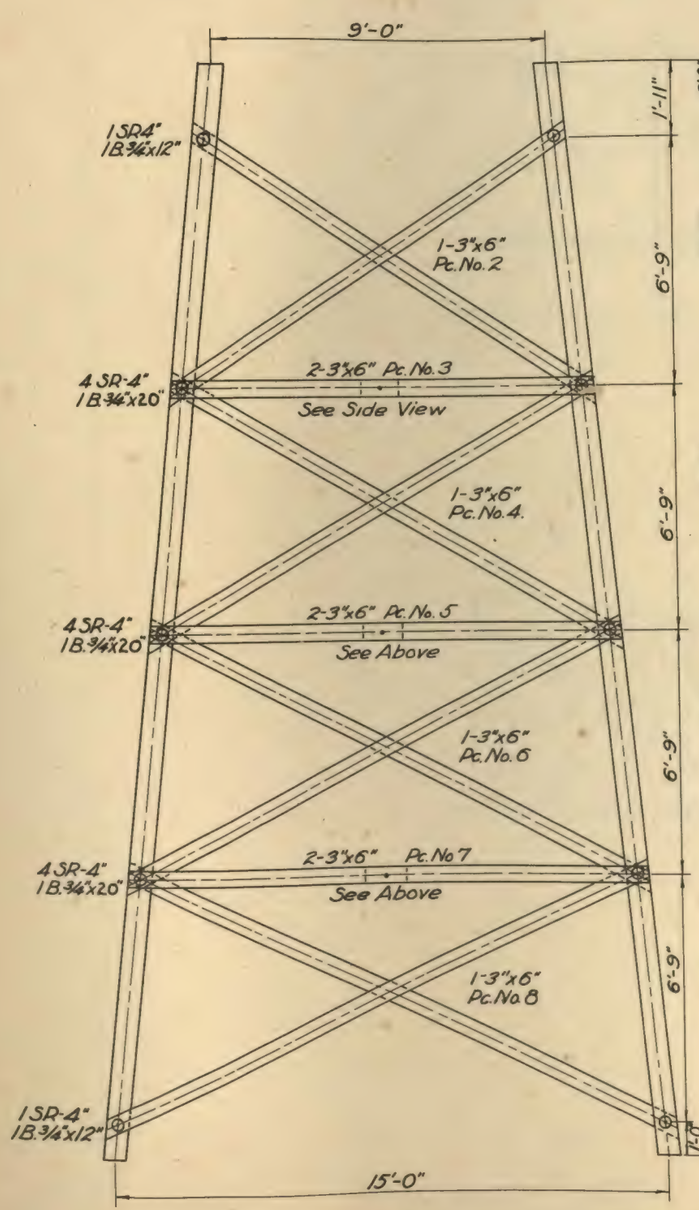
	DATE	DRAWING NO.
DESIGNED BY W.C. Brooks	8/39	B-5
CHECKED BY J.H.C. & D.S.H.	10/39	
TRACED BY W.C. Brooks	8/39	

Revised N.M. 1/10/40 J.H.C.

TANK AND LOOKOUT TOWERS

USES: Tank and lookout towers as well as signal, radio and searchlight towers, can be constructed in heights up to three hundred feet. Tank towers can efficiently be used with capacities up to two hundred thousand gallons.

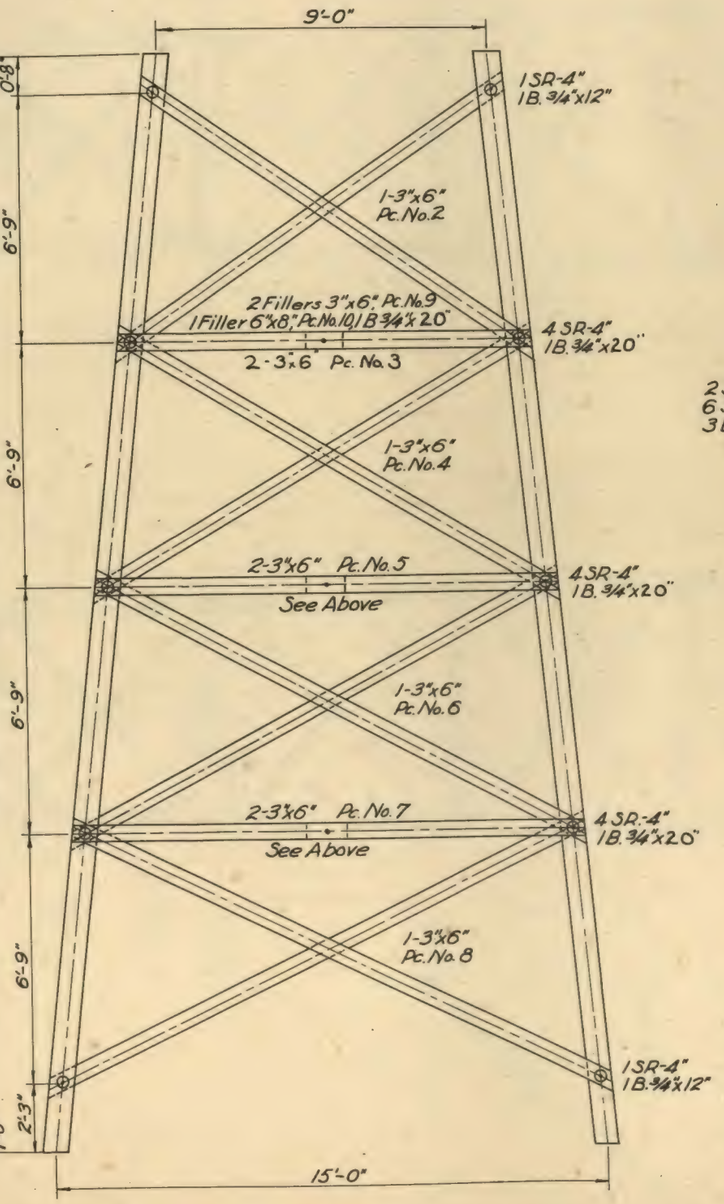
The wood lookout tower has been widely used by the U.S. Forest Service and the U. S. Biological survey for observation purposes. For a period of two years wood towers were consistently quoted and contracted for at prices lower than those of other materials.



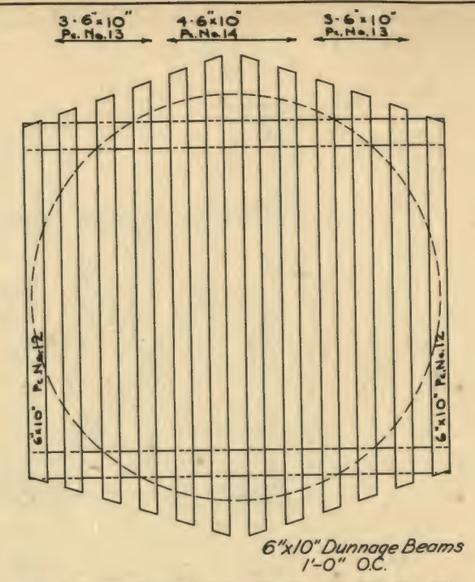
FRONT VIEW
Scale 1/2"=1'-0"

WATER TANK TOWER
Scale 1/2"=1'-0"

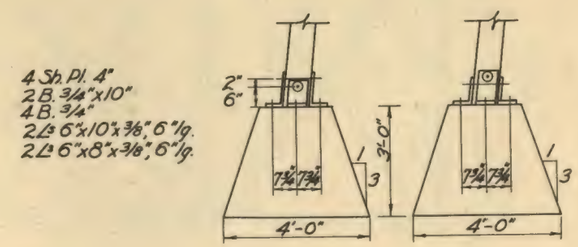
Scale in Feet



SIDE VIEW
Scale 1/2"=1'-0"



BEAM & GIRDER LAYOUT



FOOTING LAYOUT

Lumber Cutting List													
Member	Size	Length	Make	Cut from	Order	Ft. B.M.	Member	Size	Length	Make	Cut from	Order	Ft. B.M.
1	8"x8"	30'-0"	4	30'-0"	4	640	8	3"x6"	16'-7"	8	18'-0"	8	216
2	3"x6"	13'-6"	8	14'-0"	8	168	9	3"x6"	1'-0"	24	Pc. No. 4, 5, 7.		
3	3"x6"	11'-7"	8	12'-0"	8	144	10	6"x8"	1'-0"	12	12'-0"	1	48
4	3"x6"	14'-6"	8	16'-0"	8	192	11	8"x12"	11'-5"	2	12'-0"	2	192
5	3"x6"	12'-11"	8	14'-0"	8	168	12	6"x10"	9'-10"	2	10'-0"	2	100
6	3"x6"	15'-6"	8	16'-0"	8	192	13	6"x10"	11'-6"-11'-10"	6	12'-0"	6	360
7	3"x6"	14'-3"	8	16'-0"	8	192	14	6"x10"	12'-6"-13'-0"	4	14'-0"	4	280
Total - 2892 Ft. B.M.													

Connectors					
No.	Item	Size	No.	Item	Size
112	Split Rings	4"	40	Shear Plates	4"

Hardware					
No.	Item	Size	No.	Item	Size
20	Machine Bolts	3/4"x10"	104	Plate Washers	3"x3"x9/16"
16	" "	3/4"x12"	8	Angles	6"x8"x3/8", 6" lg.
36	" "	3/4"x20"	8	"	6"x10"x3/8", 6" lg.
16	Anchor	3/4"x ~	8	Steel Plates	3/8"x6"x2'-6"

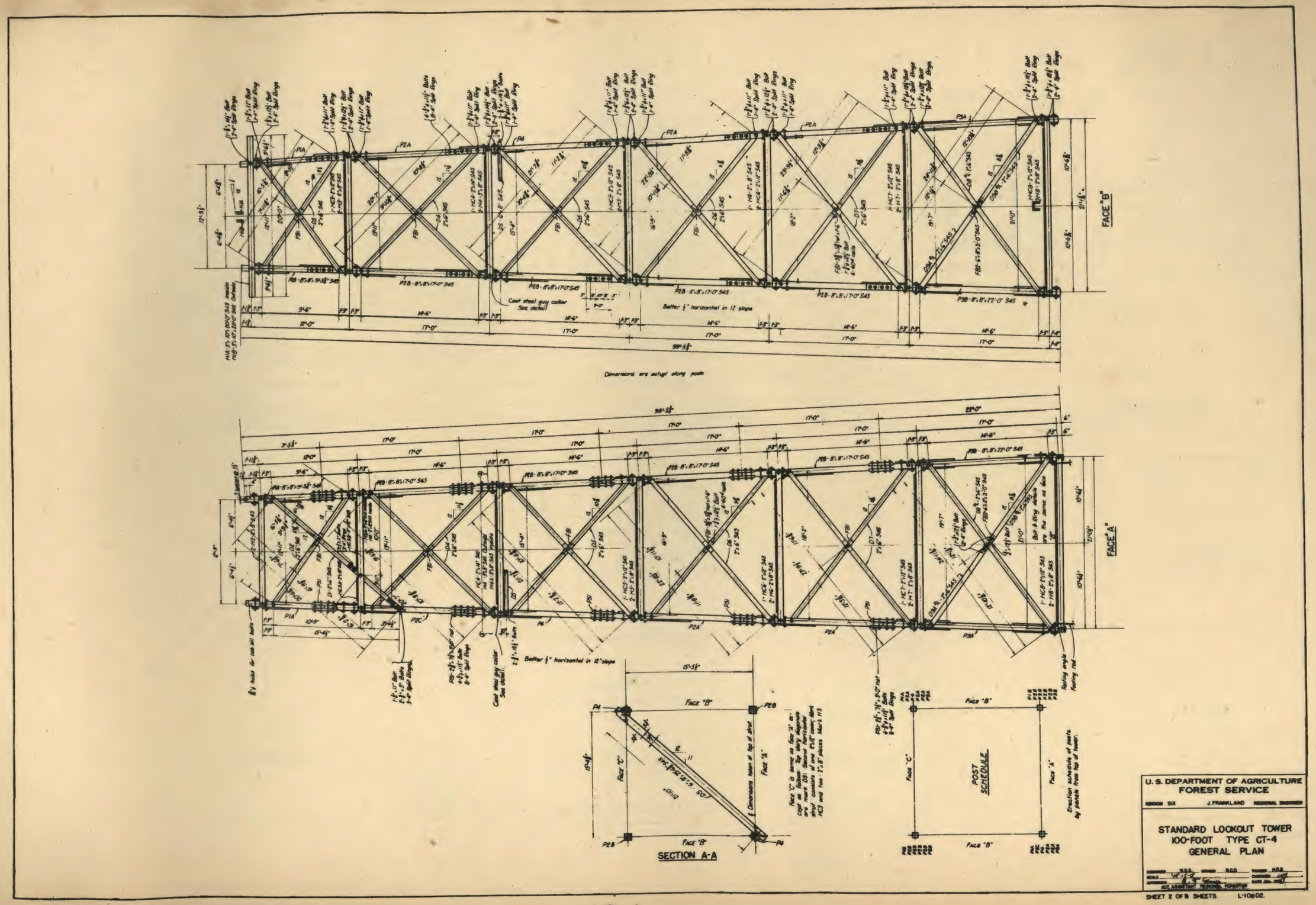
Typical design for use of Engineers and Architects

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.
WATER TOWER TANK
Capacity 5000 Gals. Hg't. 30'-0"

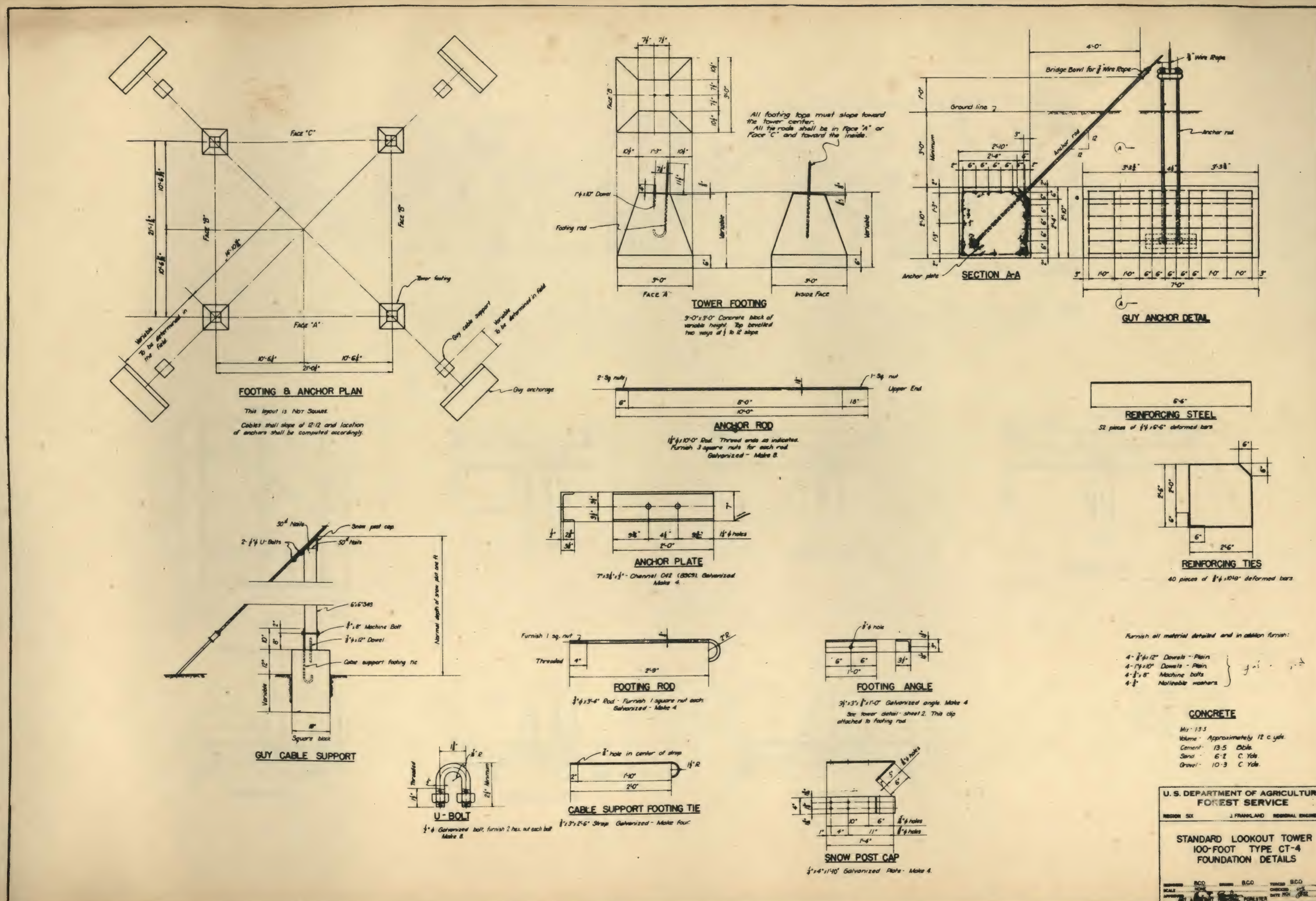
SCALE 1/2"=1'-0", SHEET 1 OF 1

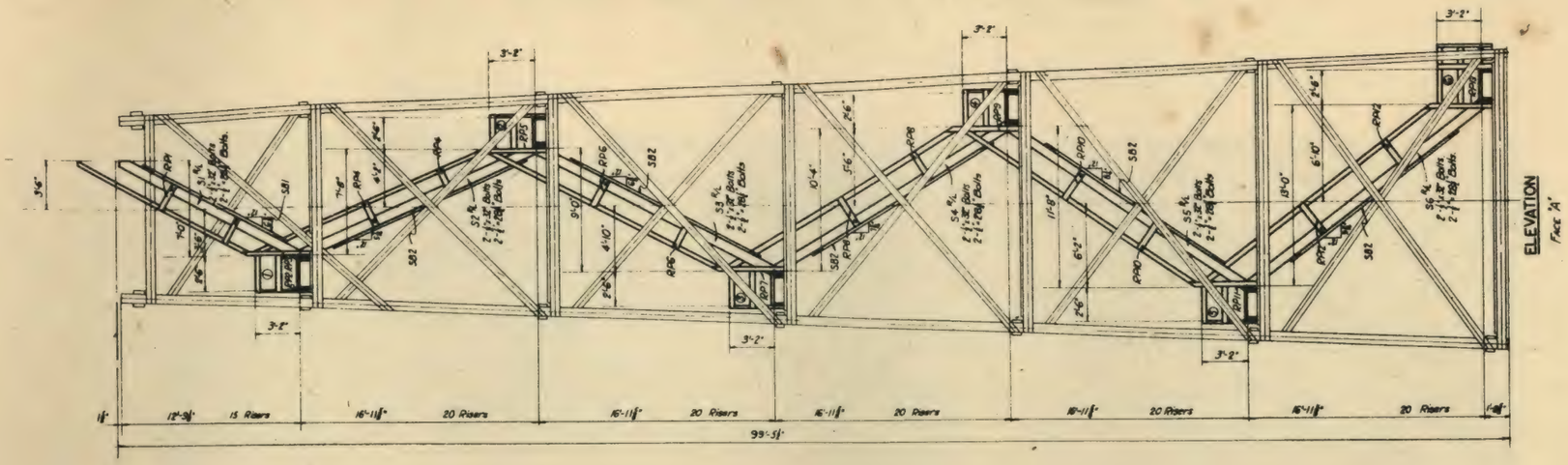
		DATE	DRAWING No.
DESIGNED BY	J.H.C.	11/23/37	250-A
CHECKED BY	R.A.B.	12/1/41	
TRACED BY	R.N.C.	12/6/41	

O.K. N.M.

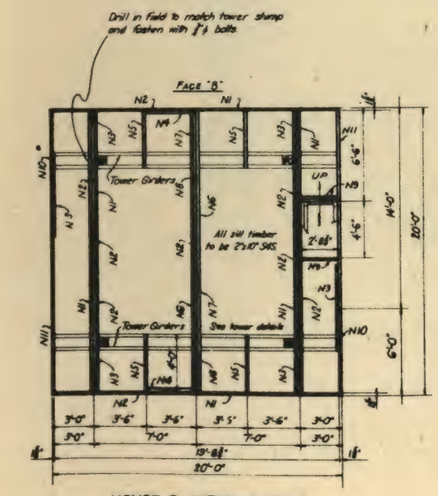

FACE "B"
FACE "A"
Dimensions are achgl along posts
Batter ½" horizontal in 12" slope
Cast steel guy collar See detail
SECTION A-A
POST SCHEDULE
Face "B"
Face "C"
Face "A"
Erection schedule of posts by panels from top of tower.
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION SIX
J. FRANKLAND
REGIONAL ENGINEER
STANDARD LOOKOUT TOWER
100-FOOT TYPE CT-4
GENERAL PLAN
ACT. ASSISTANT REGIONAL FORESTER
SHEET 2 OF 8 SHEETS.
L-10802.

13 A

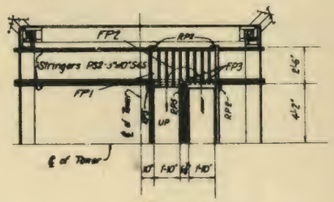

FOOTING & ANCHOR PLAN
This layout is Not Square.
Cables shall slope at 12:12 and location of anchors shall be computed accordingly.
Face "C"
Face "B"
Face "A"
Tower footing
Guy cable support
Guy anchorage
Variable To be determined in the field
TOWER FOOTING
3'-0"x3'-0" Concrete block of variable height. Top bevelled two ways at ½ to 12 slope.
All footing tops must slope toward the tower center.
All tie rods shall be in Face "A" or Face "C" and toward the inside.
Footing rod
Face "A"
Inside Face
SECTION A-A
Bridge Bowl for ⅞" Wire Rope
Ground line
Anchor rod
Anchor plate
GUY ANCHOR DETAIL
ANCHOR ROD
1⅛"φ x 10'-0" Rod. Thread ends as indicated. Furnish 3 square nuts for each rod. Galvanized - Make 8.
Upper End
REINFORCING STEEL
52 pieces of ½"φ x 6'-6" deformed bars.
REINFORCING TIES
40 pieces of ⅜"φ x 10'-9" deformed bars.
ANCHOR PLATE
7"x3⅛"x½" - Channel C42 (B3C9). Galvanized. Make 4.
GUY CABLE SUPPORT
Snow post cap
Cable support footing tie
Square block
Normal depth of snow plus one ft.
FOOTING ROD
¾"φ x 3'-4" Rod - Furnish 1 square nut each. Galvanized - Make 4.
FOOTING ANGLE
3½"x3"x⅜"x1'-0" Galvanized angle. Make 4.
See tower detail - sheet 2. This clip attached to footing rod.
U-BOLT
½"φ Galvanized bolt, furnish 2 hex. nut each bolt. Make 8.
CABLE SUPPORT FOOTING TIE
⅜"x3"x2'-6" Strap. Galvanized - Make four.
SNOW POST CAP
¼"x4"x1'-10" Galvanized Plate - Make 4.
Furnish all material detailed and in addition furnish:
4-⅞"φ x 12" Dowels - Plain
4-1"φ x 10" Dowels - Plain
4-⅜"x 8" Machine bolts
4-⅜" Malleable washers
CONCRETE
Mix - 1:3:5
Volume - Approximately 12 c. yds.
Cement - 13.5 Bbls.
Sand - 6.2 C. Yds.
Gravel - 10.3 C. Yds.
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION SIX
J. FRANKLAND REGIONAL ENGINEER
STANDARD LOOKOUT TOWER
100-FOOT TYPE CT-4
FOUNDATION DETAILS
SHEET 1 OF 8 SHEETS
L-108.01



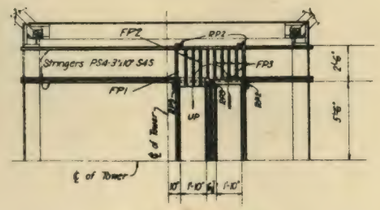
ELEVATION
Face 'A'



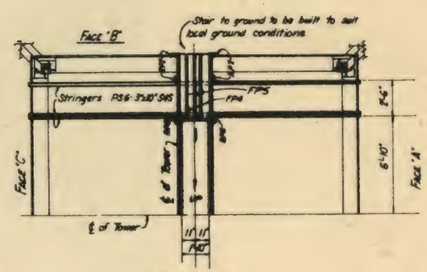
HOUSE & CATWALK SILLS



PLATFORM TWO

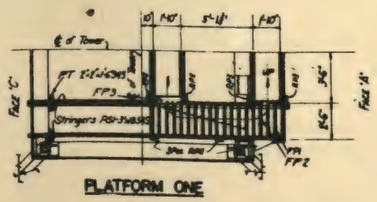


PLATFORM FOUR

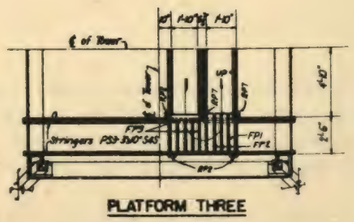


PLATFORM SIX

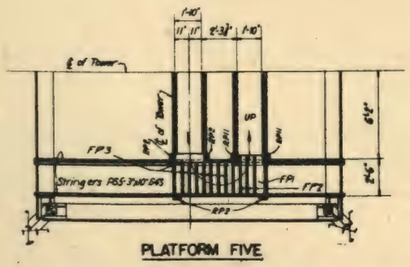
Make certain to start stairs in the proper face



PLATFORM ONE



PLATFORM THREE



PLATFORM FIVE

Stair stringers to rest directly on joists and not on platform plank

MATERIAL SIZES

House & Catwalk Sills	2"x10"	S4S	Treated
Stair Stringers	3"x8"	"	"
Stair Treads	2"x8"	"	"
Platform Stringers	3"x10"	"	"
Platform Floor Plank	2"x6"	"	"
Rail Posts	2"x4"	"	"
Stair Stringer Sways	2"x4"	"	"
Hand Rails	2"x4"	"	Untreated

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
FOREST SVC JONES FRANKLAND REGIONAL ENGINEER

STANDARD LOOKOUT TOWER
100-FOOT TYPE CT-4
STAIR LAYOUT

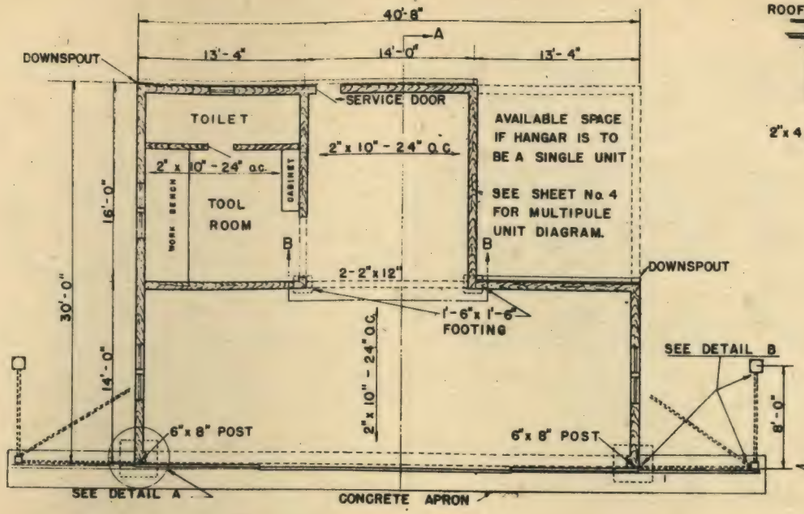
DESIGNED B.O.D. DRAWN B.O.D. TRACED H.R.S.
SCALE 1/4" = 1'-0" DATE 2-8-35
APPROVED [illegible] DATE [illegible]

SHEET 3 OF 8 SHEETS L-10803

AIRPLANE HANGARS

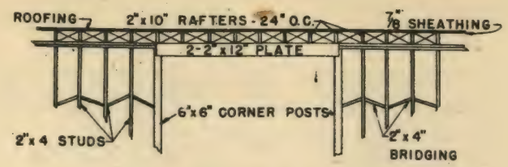
USES: Wooden hangars may be economically constructed with door openings up to two hundred feet in width. Any of the standard types of roof trusses may be used although in the longer spans the bowstring trusses are most satisfactory. In spans in excess of one hundred fity feet it is often advisable to use an arch.

The type of wood hangar most commonly used is intended primarily to provide low-cost housing for aircraft and therefore has a minimum of architectural treatment. The appearance of course can be improved according to the wishes of the owner.



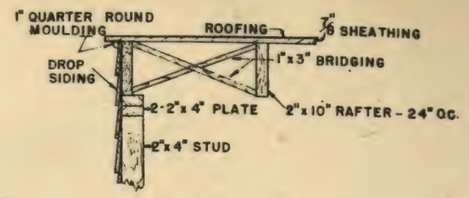
PLAN

SCALE: $\frac{3}{16}$" = 1'-0"



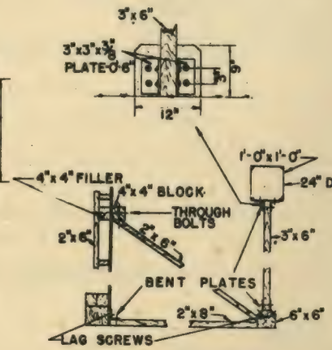
SECTION B-B

SCALE: $\frac{3}{16}$" = 1'-0"



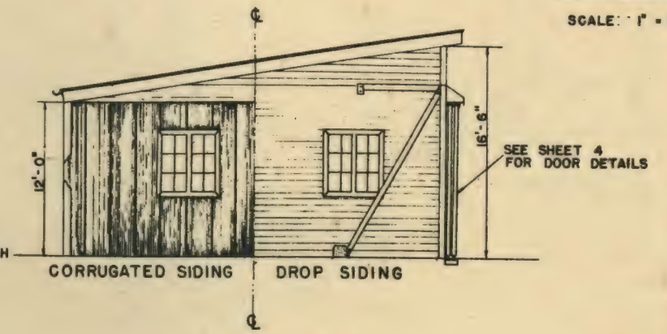
EAVE DETAIL

SCALE: 1" = 1'-0"



DETAIL — B

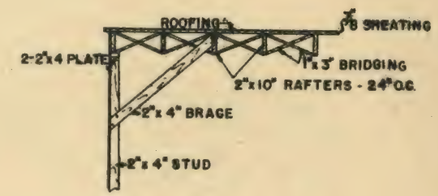
SCALE: $\frac{1}{2}$" = 1'-0"



SIDE ELEVATION

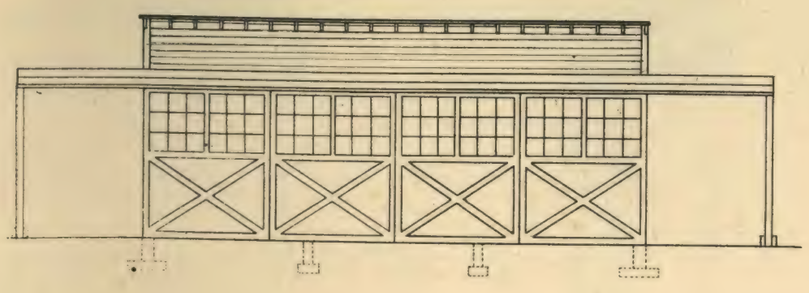
SHOWING ALTERNATE SIDING

SCALE: $\frac{3}{16}$" = 1'-0"



DETAIL — C

SCALE: $\frac{3}{8}$" = 1'-0"



FRONT ELEVATION

SCALE: $\frac{3}{16}$" = 1'-0"

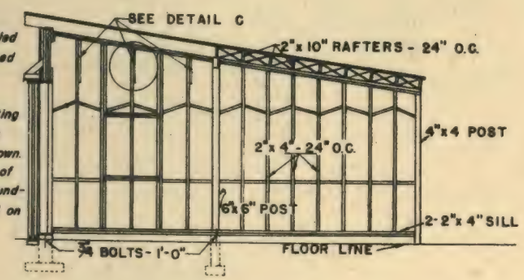
0 5 10 15 20 25 30 FEET

GRAPHIC SCALE OF ELEVATIONS & FLOOR PLAN

NOTES:

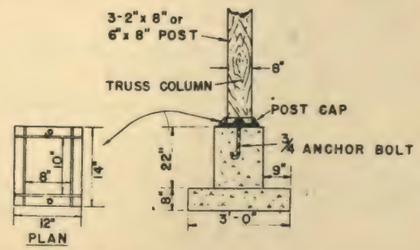
Studs to be doubled around and bridged at all openings.

Footings supporting the main columns recomended as shown. Width and depth of the remaining Foundation will depend on local conditions.



SECTION A-A

SCALE: $\frac{3}{16}$" = 1'-0"



Note: Angles may be substituted for Post Cap.

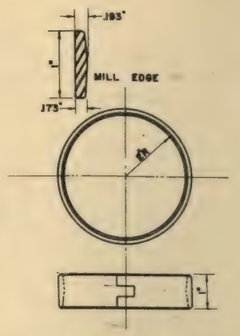
DETAIL — A

SCALE: $\frac{1}{2}$" = 1'-0"

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
AIRPORT DIVISION
ENGINEERING AND CONSTRUCTION SECTION

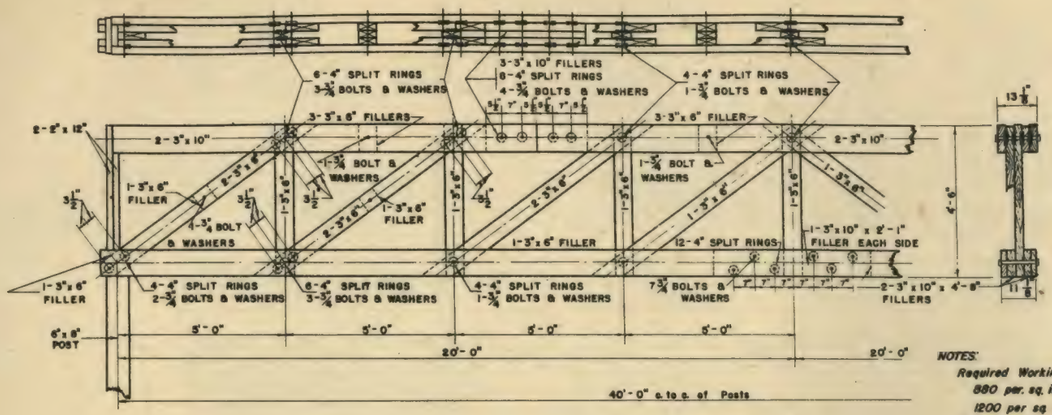
LOW COST UNIT HANGAR FOR SMALL AIRPLANES

REV.	APPROVED:	DIVISION CHIEF	
	REVIEWED:	SECTION CHIEF	
	SUBMITTED:	ARCHITECT.	
	CHECKED:	DRAWN BY: A. E. Scale	
	DATE: 7-12-41	SHEET 2 OF FOUR	Dg. No. 280



SPLIT RING DETAIL

SCALE: $\frac{1}{2}$" = 1'-0"



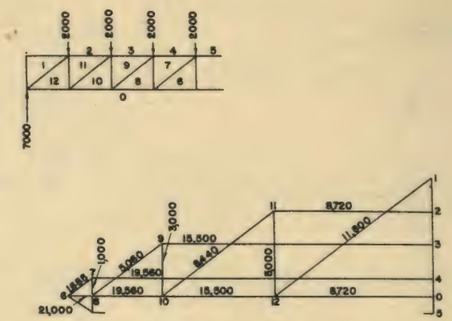
DETAIL OF TRUSS OVER DOOR OPENING

SCALE: $\frac{1}{2}$" = 1'-0"

GRAPHIC SCALE IN FEET

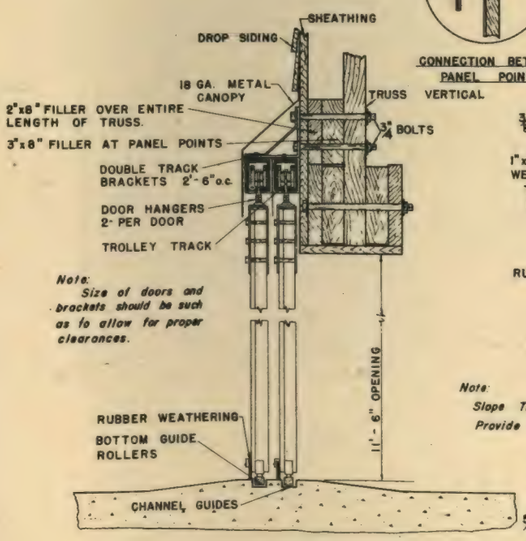
NOTES:

Required Working Stresses:
880 per. sq. in. Compression Parallel to Grain.
1200 per sq. in. Extreme Fiber in Bending.
1,600,000 per sq. in. Modulus of Elasticity.
For Proper Camber Raise Lower Chord 3/4" at the Center During Fabrication.
Timber Connectors Shall be of the Split Ring Type as Detailed.



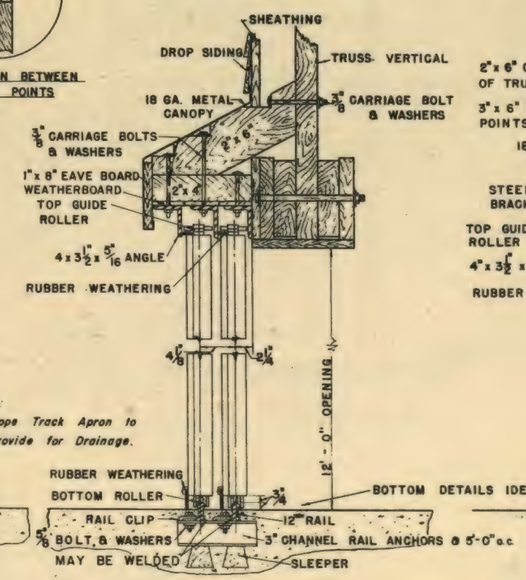
STRESS DIAGRAM

CONNECTION BETWEEN PANEL POINTS



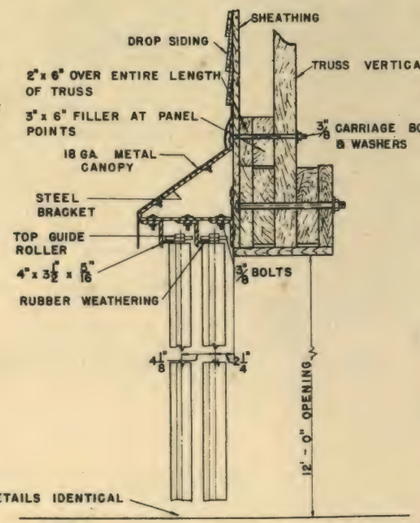
TOP HUNG TYPE

USING CHANNELS FOR BOTTOM. GUIDES



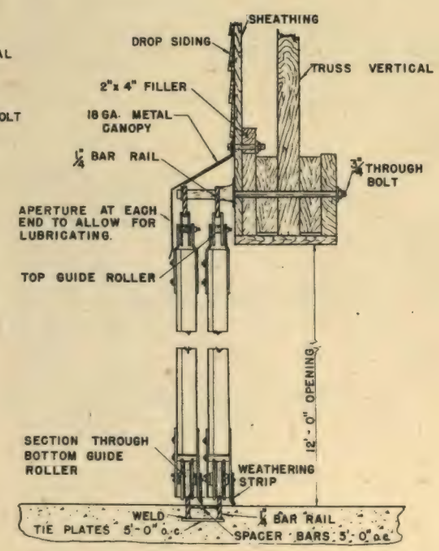
BOTTOM ROLLER TYPE

USING FRAME SUPPORT FOR ANGLE GUIDES



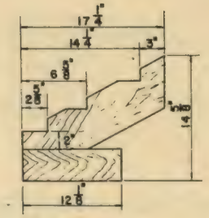
BOTTOM ROLLER TYPE

WITH BRACKETS SUPPORTING ANGLE GUIDES



BOTTOM ROLLER TYPE

WITH BAR RAIL GUIDES



DETAIL OF FRAME SUPPORT FOR ANGLE GUIDES

SCALE: $\frac{1}{8}$" = 1 inch

SUGGESTED TPYPICAL ALTERNATE DESIGNS FOR SLIDING DOORS

SCALE: $\frac{1}{8}$" = 1 inch

GRAPHIC SCALE IN INCHES

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
AIRPORT DIVISION
ENGINEERING AND CONSTRUCTION SECTION

LOW COST UNIT HANGAR FOR SMALL AIRPLANES

REV.	APPROVED: G. B. McMullen, DIVISION CHIEF.		
	REVIEWED: Charles B. Donaldson, SECTION CHIEF.		
	SUBMITTED: L. S. Bank Jr., ARCHITECT		
	CHECKED: L.C.G.	DRAWN BY: A. E. Scale	
	DATE: 7-12-41	SHEET 3 OF FOUR	DR. No. 280

BILL OF MATERIALS

NOTE:
This Hangar is Designed Primarily to be used as a Single Unit, however, if Added Hangar Space is desired Units may be grouped as shown Below:

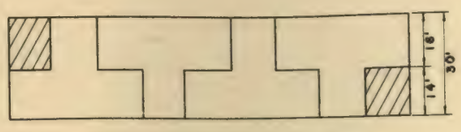


DIAGRAM FOR GROUPING UNITS

FOUNDATION

CONCRETE ITEM	QUANTITY	COST
FOUNDATION PIERS (As Shown)	1 CU. YD.	
HANGAR FLOOR (If Used)	15 CU. YDS	
BRACE POSTS	1/4 CU. YD.	
TRACK FOUNDATION	8 1/3 CU. YDS.	
OTHER FOOTINGS		

HARDWARE No	SIZE	ITEM	COST
2	8" x 10"	POST CAP (WITH BOLTS)	
6	3/4" x 1'-0"	FOUNDATION BOLTS & WASHERS	
8	1/2" x 8"	BOLTS FOR BRACE POST "	
		WASHERS	

DRAINAGE			
24	LINEAL	FEET OF DOWNSPOUTS	
40	LINEAL	FEET OF GUTTERS	

SLIDING DOOR TRACKS (WITH 12# RAIL No	ITEM	COST
100	LINEAL FEET 12# INDUSTRIAL RAIL	
24	RAIL CLIPS - BOLTS & NUTS ATTACHED	
12	3"-4.1 CHANNELS 12" FOR RAIL ANCHORS	
10	CREOSOTE SLEEPERS 12'-0" LENGTH	

ALTERNATES - COMPLETE

SLIDING DOOR TRACKS (USING BAR RAILS) No	ITEM	COST
100	LINEAL FEET BAR RAIL 1/4 inch	
12	TIE PLATES 1/4 x 12"	
12	SPACERS 1/4 PLATES	
10	CREOSOTE SLEEPERS 12" LENGTHS	

CHANNEL GUIDES (USED WITH TOP HUNG DOOR No	ITEM	COST
100	LINEAL FEET 3"-4.1# CHANNELS	
12	TIE PLATES 1/4" x 12"	

FRAMING

OUTSIDE WALLS & PARTITIONS No.	SIZE	ITEM	BD. FT.	COST
4	2" x 4" x 18'	STUDS BRIDGING & OPENINGS	48	
25	2" x 4" x 16'	" " "	267	
18	2" x 4" x 14'	" " "	168	
34	2" x 4" x 12'	" " "	272	
14	2" x 4" x 10'	" " "	94	
12	2" x 4" x 16'	SILLS - TOP & BOTTOM	128	
24	2" x 4" x 14'	" " "	220	
2	4" x 4" x 16'	CORNER POSTS	43	
3	4" x 4" x 12'	" "	48	
4	4" x 4" x 12'	PART TRUSS COLUMN	64	
2	6" x 6" x 16'	CENTER COLUMNS	96	
2	6" x 8" x 12'	TRUSS COLUMNS	96	
2	2" x 12" x 14'	CENTER BEAM	56	
6	2" x 4" x 10'	KNEE BRACES	40	
		TOTAL	1640	

ROOFING No	SIZE		BD. FT	COST
40	2" x 10" x 16'	RAFTERS	1067	
20	1" x 3" x 12'	BRIDGING	60	

DOORS - BRACES - SUPPORTS FOR GUIDES No	SIZE	ITEM	BD. FT.	COST
8	2" x 8" x 10'	TOP & BOTTOM CHORD	107	
12	2" x 6" x 12'	BRACING	144	
8	2" x 8" x 12'	END PIECES	128	
8	2" x 2" x 4'	BETWEEN WINDOWS	11	
8	5/8" x 4" x 4'	" "	8	
2	6" x 6" x 16'	END POST OF BRACE	96	
2	2" x 8" x 10'	STRAIGHT BRACE	27	
2	2" x 8" x 12'	DIAGONAL BRACE	32	
2	3" x 6" x 16'	DIAGONAL TIE-END POST	48	
* 4	2" x 8" x 8'	SUPPORT FOR ANGLE GUIDES	43	
* 1	2" x 4" x 14'	" " " "	10	
* 5	1" x 8" x 12'	EAVE BOARD	40	
		TOTAL	694	

ALTERNATE GUIDE SUPPORTS

BRACKET SUPPORT FOR ANGLE GUIDES		
13	BRACKETS	
39	BOLTS (Connecting Angles to Brackets) 5/8" x 1"	
26	BOLTS (Connecting Brackets to Canopy) 5/8" x 1"	
13	CARRIAGE BOLTS 5/8" x 10"	
4	2" x 6" x 12' FILLER FOR BOLTING	

NOTE:
Items indicated by asterisks to be omitted if brackets are used to support angle guides.

SHEATHING & SIDING

SIDE WALLS (USING SHIPLAP ONLY) No.	SIZE	ITEM	BD. FT.	COST
60	7/8" x 5" x 16'	SHIPLAP	480	
118	7/8" x 5" x 14'	"	826	
24	7/8" x 6" x 12'	"	144	
18	3/4" x 8" x 16'	WEATHERBOARD	180	
		TOTAL	1630	

SIDE WALLS (CORRUGATED & SHIPLAP) No.	SIZE	ITEM	BD. FT.	COST
51	20 GA 2" x 12'	CORRUGATED SIDING		
14	7/8" x 5" x 14'	SHIPLAP	98	
46	7/8" x 5" x 12'	"	276	
18	3/4" x 8" x 16'	WEATHERBOARD	180	
		TOTAL	554	

PARTITIONS		
442	SQUARE FEET WALLBOARD	

ROOFING No.	SIZE	ITEM	BD. FT.	COST
110	1" x 8" x 14'	SHEATHING	1030	
140'	1/4" Round	MOULDING		
		TOTAL	1030	

DOORS No.	SIZE	ITEM	BD. FT.	COST
100	3/8" x 3" x 12'	T & G BEADED SIDING	300	
200'	5/8 inch	QUARTER ROUND MOULDING		
		TOTAL	300	

TRUSS SCHEDULE

FRAMING ITEM	No.	SIZE	LENGTH	BD FT
UPPER CHORD - END	4	3" x 10"	13'-1"	140
UPPER CHORD - MIDDLE	2	3" x 10"	16'-2"	80
LOWER CHORD	4	2" x 10"	20'-6"	147
DIAGONALS	14	3" x 6"	8'-0"	168
VERTICALS	7	3" x 6"	4'-6"	50
END PIECE	2	2" x 12"	4'-0"	16
UPPER CHORD SPLICE PIECE	4	3" x 10"	2'-11"	30
LOWER " " "	2	3" x 10"	4'-8"	25
UPPER CHORD FILLERS	2	3" x 10"	2'-11"	15
LOWER " "	2	3" x 10"	2'-1"	10
DIAGONAL FILLERS	4	3" x 6"	0'-6"	3
JOINT FILLERS	12	3" x 6"	0'-10"	15
			TOTAL	699

GENERAL ITEMS

4	3" x 2" x 3/8" x 0'-6" BENT PLATES - DETAIL B	
6	3" x 3" x 3/8" x 0'-6" " " "	
4	5/8" x 2" CARRIAGE BOLTS "	
8	5/8" x 4" " " "	
4	5/8" x 6" " " "	
4	5/8" x 12" " " "	
12	5/8" x 3" LAG SCREWS "	
1	GAL MASTIC FILLER FOR TRACK APRON	
60	FT 18GA GALV METAL CANOPY (As Shown)	
1	KEG 20d NAILS	
1	" 10d "	
10	lbs. 8d "	
15	" 6d " FOR SIDING	
5	" 4d "	
5	" 1 1/4" GALV. ROOFING NAILS	
* 4	" SIDE LAP BOLTS WITH FIBER WASHERS	
* 1	GROSS OF FIBER WASHERS	
* 5	lbs. 1 1/2" GALV CLOUT NAILS	
16	3/16" ANGLE BRACES - 12" LEGS	
16	" T " " "	

NOTE:
Items indicated by asterisks to be used with corrugated siding only

MISCELLANEOUS

DOOR & WINDOW SCHEDULE (Include frames) No.	SIZE	TYPE	LIGHTS	COST
6	2'-0" x 4'-6"	MULLION - DOUBLE HUNG	6	
1	2'-0" x 4'-6"	DOUBLE HUNG	6	
16	2'-0 1/8" - 3'-11 3/8"	FOR HANGAR DOORS	6	
1	2'-0" x 6'-8"	SERVICE DOORS		

TRUSS HARDWARE ITEM	No.	SIZE	TYPE	COST
TIMBER CONNECTORS	104	4"	SPLIT RING	
BOLTS & NUTS & WASHERS	28	3/4" x 15"	CARRIAGE	
" " "	20	3/4" x 13"	"	
" " "	4	3/4" x 10"	"	

ROOFING		
11	ROLLS FELT WATERPROOF ROOFING @ 100 SQ. FT.	
11	" 15# SHEATHING PAPER (Mop with pitch)	
10	GALLONS ROOFING ASPHALT	

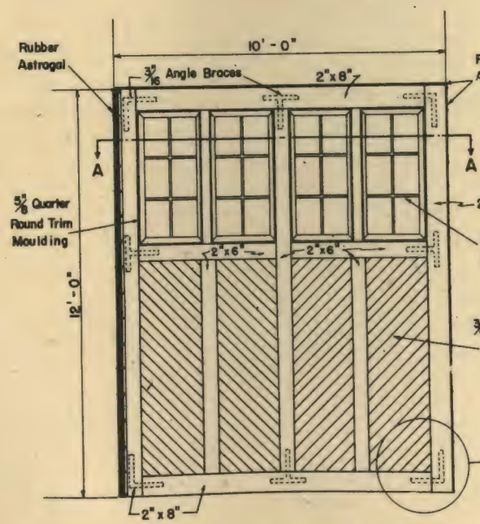
SLIDING DOOR EQUIPMENT		
8	TOP GUIDE ROLLER ASSEMBLY - COMPLETE	
8	BOTTOM ROLLERS	
* 2	CANE BOLTS ETC.	
* 8	RUBBER ASTRAGALS 4" x 12'-0" (As Shown)	
4	RUBBER WEATHERING STRIPS - TOP "	
* 4	" " " " - BOTTOM "	
* 4	METAL STRIPS & SCREWS FOR ASTRAGALS "	
* 4	" " " " WEATHERING "	
40'	GUIDE ANGLES - INSIDE DOORS	
120'	" " " - OUTSIDE DOORS	
2	DOOR STOPS - OPEN	
2	" " - CLOSED	
18	5/8" x 8" CARRIAGE BOLTS & WASHERS	
13	5/8" x 10" " " "	
13	5/8" x 10" " " "	

ALTERNATES - DOOR HARDWARE

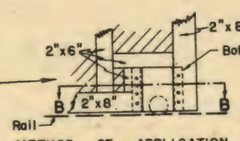
SLIDING DOOR EQUIPMENT (TOP HUNG DOOR)		
20	BRACKETS (WITH BOLTS)	
104'	TRACK	
8	HANGERS	
8	BOTTOM ROLLERS	
2	DOOR STOP BRACKETS - OPEN	
2	" " " - CLOSED	

SLIDING DOORS (USING BAR RAILS & GUIDES)		
8	TOP GUIDE ASSEMBLY	
8	BOTTOM ROLLER ASSEMBLY	
104'	BAR GUIDES - TOP 1/4"	
2	DOOR STOPS - OPEN - PLATE	
2	" " - CLOSED - "	

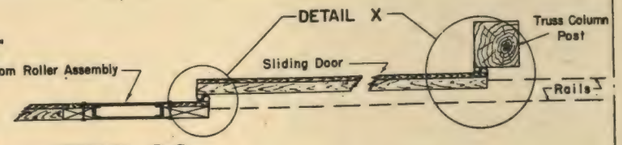
NOTE:
Items indicated by asterisks to be used with alternates also.



DOOR ELEVATION



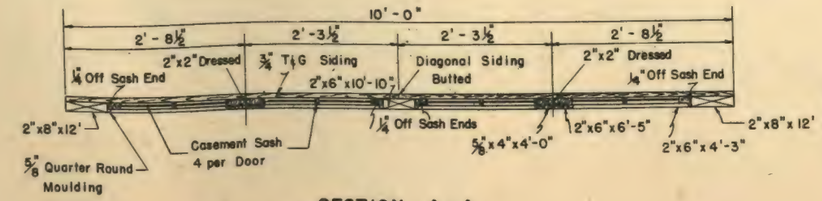
METHOD OF APPLICATION FOR BOTTOM ROLLER ASSEMBLY



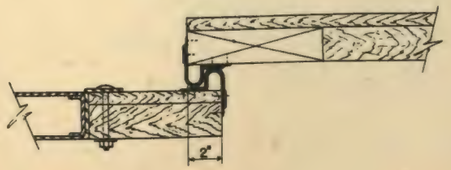
SECTION B-B

ASTRAGAL CONNECTIONS

SCALE: - 1" = 1'-0"

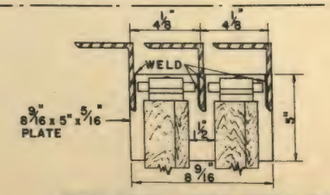


SECTION A-A



DETAIL X

SCALE - 1/4" = 1'-0"



DOOR STOP - USING ANGLE GUIDES

SCALE: - 1/4" = 1'-0"

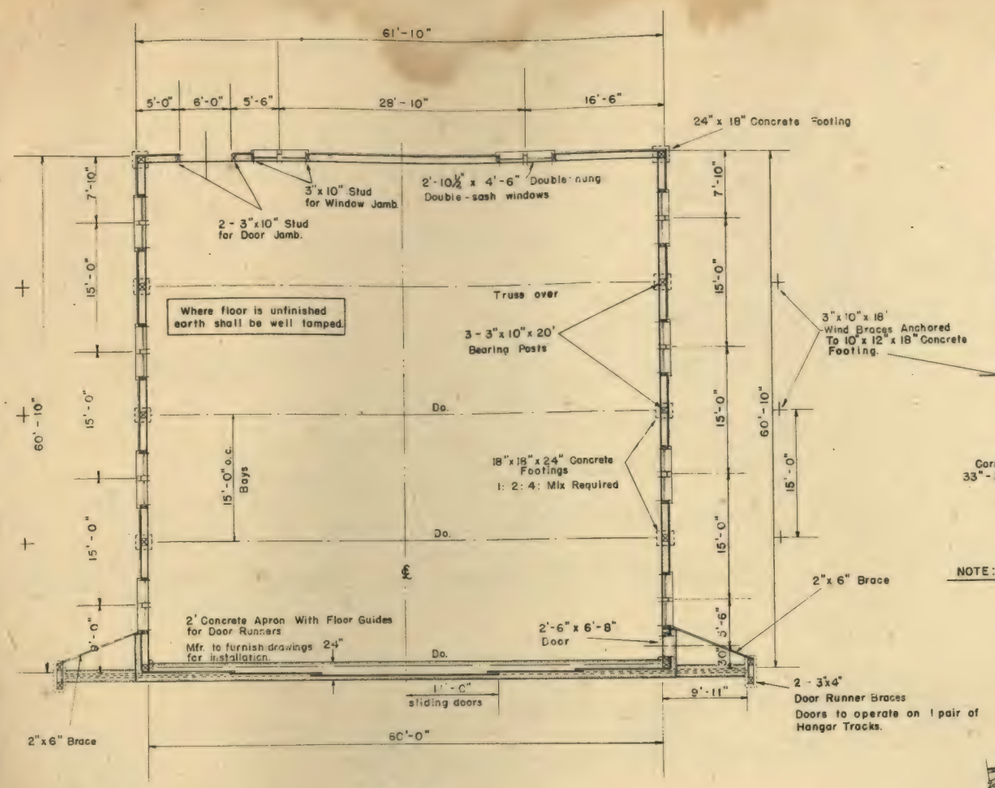
0 12 24
INCHES

4464

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
AIRPORT DIVISION
ENGINEERING AND CONSTRUCTION SECTION

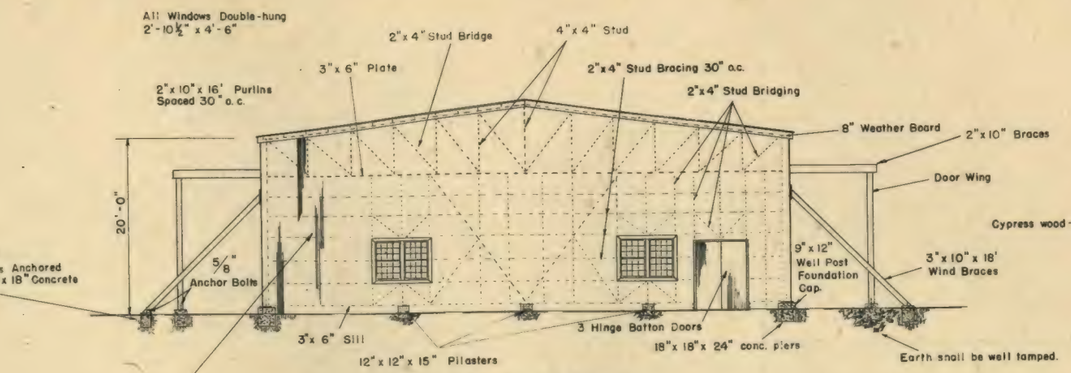
LOW COST UNIT HANGAR FOR SMALL AIRPLANES

REV.		
	APPROVED:	DIVISION CHIEF.
	REVIEWED:	SECTION CHIEF.
	SUBMITTED:	ARCHITECT.
	CHECKED: K.E.B.	DRAWN BY: A.E. Seals
	DATE: 7-12-41	SHEET 4 OF FOUR — Dr. No. 280



PLAN

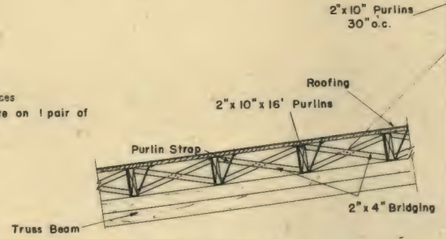
SCALE: 1/8" = 1'-0"



REAR ELEVATION

SCALE: 1/8" = 1'-0"

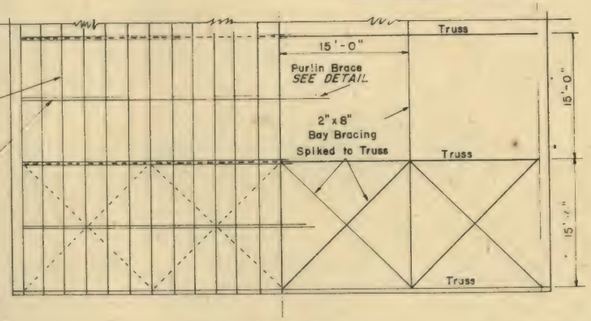
NOTE: Studs shall be doubled around all openings.



PURLIN BRIDGING DETAIL

SCALE: 1/2" = 1'-0"

Cross-Bracing on End Bays only.



BRACING DIAGRAM

LAP JOINT DETAIL

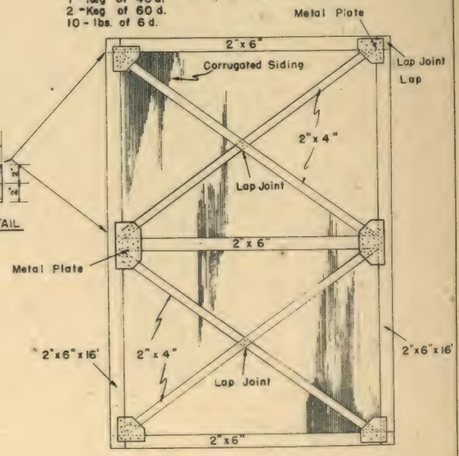
MATERIAL LIST

EXCLUSIVE OF TRUSSES AND BEARING POSTS*

ORDER	SIZE	LENGTH	FT. B-M	COST
16	2" x 4"	12'	115.2	
98	2" x 4"	16'	940.8	
60	2" x 4"	18'	648.0	
18	2" x 6"	12'	216.0	
12	2" x 6"	16'	192.0	
22	2" x 8"	16'	492.8	
104	2" x 10"	16'	3,110.4	
10	2" x 10"	18'	1,440.0	
6	2" x 10"	1'-6"	72.0	
8	3" x 4"	16'	18.0	
21	3" x 6"	20'	632.0	
4	3" x 10"	8'	83.2	
20	3" x 10"	16'	832.0	
6	3" x 10"	18'	63.6	
16	1" x 8"	16'	24.0	
3	1/2" x 3"	10'	3.7	
		TOTAL	8,883.7	

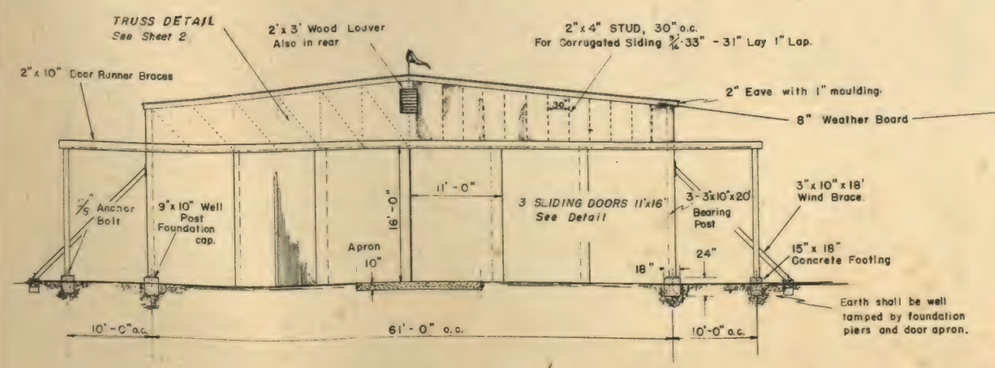
*See Sheet 2

10 Double-Sash Double Hung Windows 2'-10½" x 4'-6".
1 Stock Panel Door 2'-6" x 6'-8"
20 Cement Bags
1.5 Cubic Yards of Sand.
3.0 " " " Stone Aggregate.
5,104 Ft. gal. Corrugated Siding.
3,844 " " " Roofing.
200 Purlin Straps; bolts etc.
10 - 5/8" Anchor Bolts
10 - 9" x 12" Well Post Foundation Caps.
2 - Kegs of 16 d. common cut steel nails.
1 - Keg of 20 d. " " " "
1 - Keg of 40 d. " " " "
2 - Keg of 60 d. " " " "
10 - lbs. of 6 d.

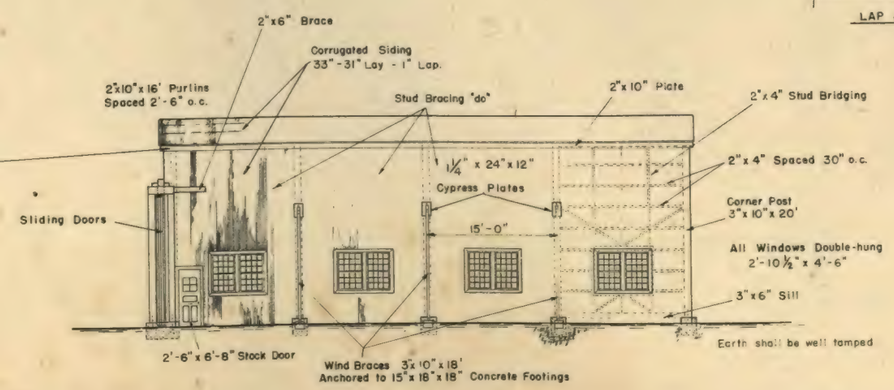


DOOR FRAMING DETAIL

SCALE: 3/8" = 1'-0"



FRONT ELEVATION



SIDE ELEVATION

Scale: 1/8" = 1'-0"

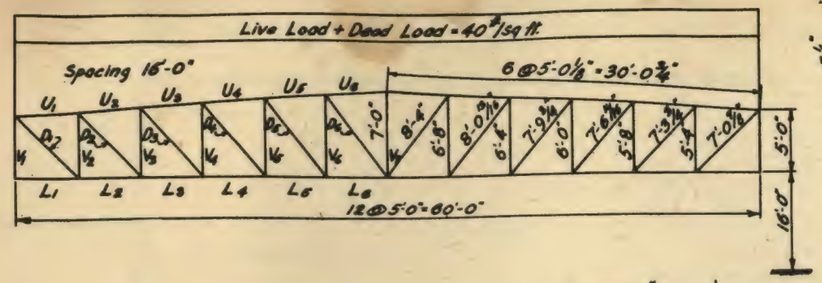
0 10 20

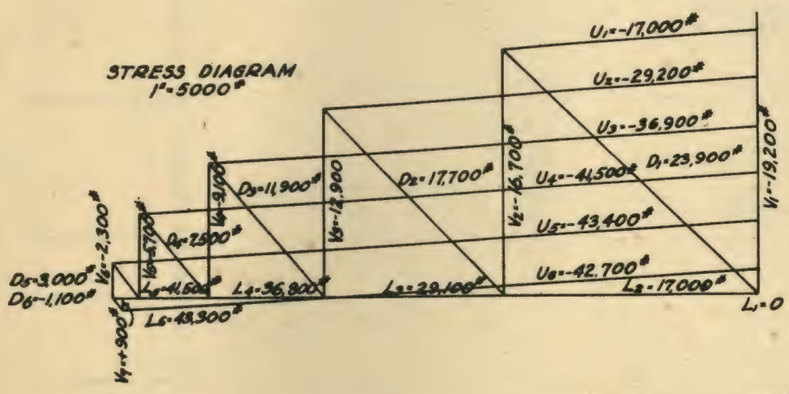
Estimated Cost $2,000. - $2,500.

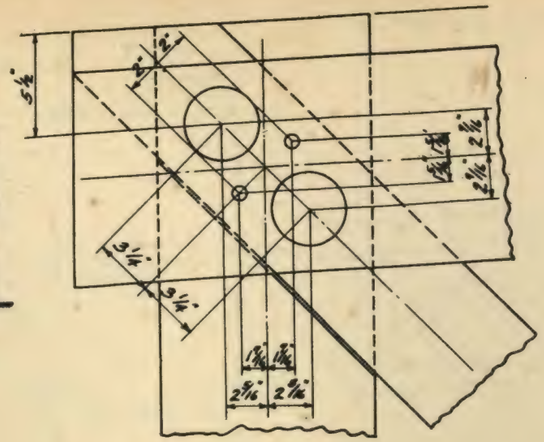
CIVIL AERONAUTICS AUTHORITY
BUREAU OF FEDERAL AIRWAYS – TECHNICAL DEVELOPMENT DIVISION
· AIRPORT SECTION ·

FRAME HANGAR 60' x 60'

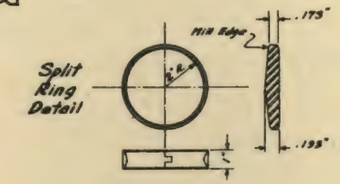
REV.	APPROVED:	SECTION CHIEF
	SUBMITTED:	AIRPORT ENGINEER
		SR AIRPORT ENGINEER
	DRAWN BY: H. P. Beach, Jr.	
	DATE: 4/8/39	SHEET: one — DR. NO. 100

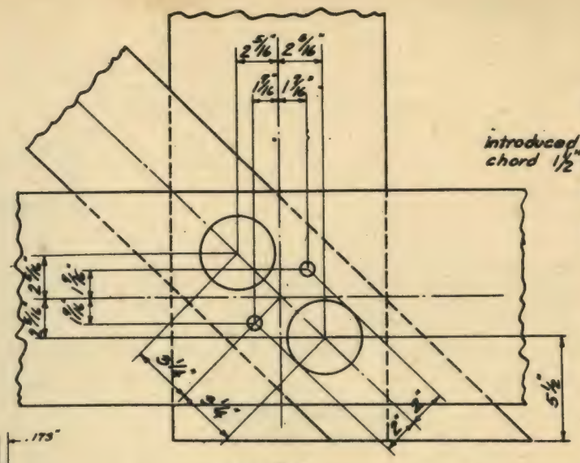






JOINT "A"
Scale: 3" = 1'-0"





JOINT "B"
Scale: 3" = 1'-0"

CAMBER

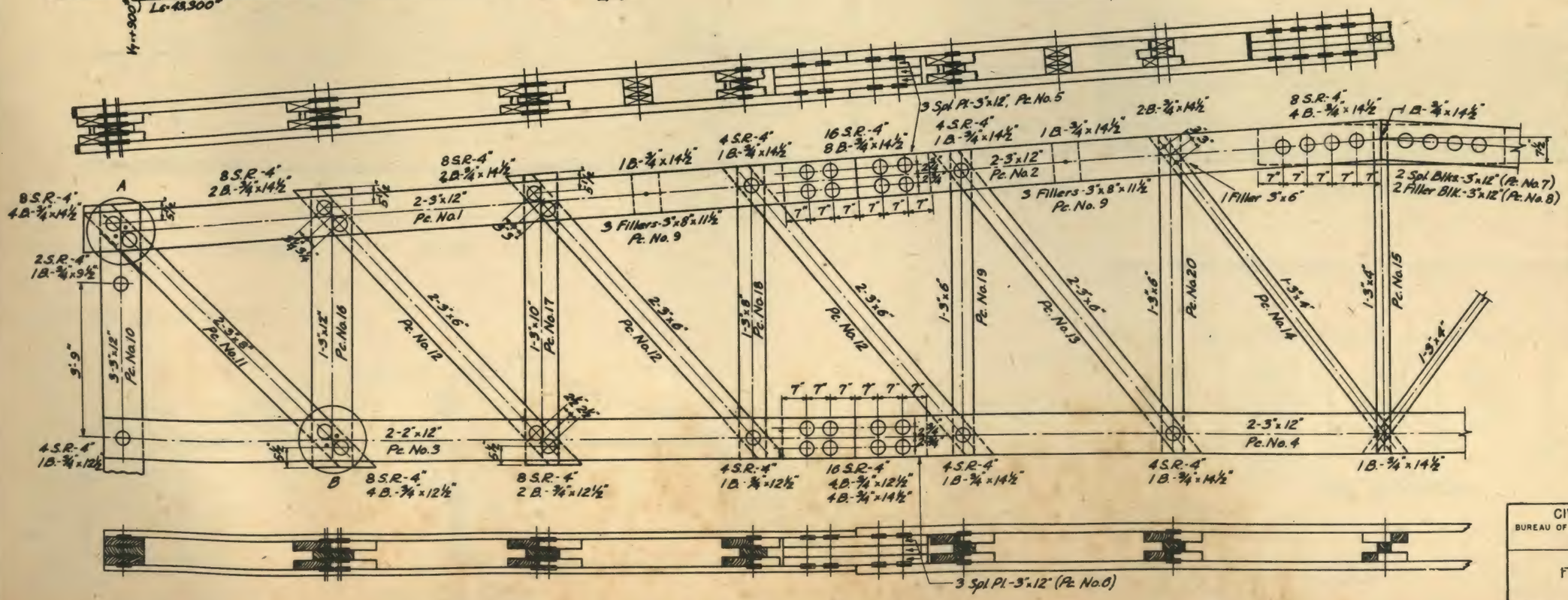
The proper camber may be introduced into this truss by raising the lower chord 1 1/2" at the center during fabrication.

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in pounds per sq. in. as follows:
880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of Elasticity

TIMBER CONNECTORS

Connectors shall be the Split Ring type as detailed.



60 FT. FLAT TOP PRATT TRUSS
Scale: 3/4" = 1'-0"
0 1 2 3
Scale in Feet

MATERIALS LIST PER TRUSS

LUMBER CUTTING BILL (343)

Mk.	Size	Length	Make	Cut From	Order	F.B.M.
1	3"x12"	18'-5"	4	20'-0"	4	240
2	3"x12"	12'-6"	4	14'-0"	4	168
3	2"x12"	17'-10"	4	18'-0"	4	144
4	3"x12"	25'-0"	2	26'-0"	2	156
5	3"x12"	3'-6"	6	14'-0"	3	126
6	3"x12"	3'-6"	6			
7	3"x12"	5'-10"	2	18'-0"	1	54
8	3"x12"	2-9 1/4"	2			
9	3"x8"	0'-11 1/2"	12	Pc's No. 1 & 2		
10	3"x12"	21'-8"	6	22'-0"	6	396
11	3"x8"	9'-4"	4	20'-0"	2	80
12	3"x6"	9'-6"	12	20'-0"	6	180
13	3"x6"	9'-6"	4	20'-0"	2	60
14	3"x4"	9'-8"	2	10'-0"	2	20
15	3"x4"	8'-0"	1	8'-0"	1	8
16	3"x12"	6'-8"	2	14'-0"	1	42
17	3"x10"	7'-0"	2	14'-0"	1	35
18	3"x8"	7'-0"	2	14'-0"	1	28
19	3"x6"	7'-4"	2	16'-0"	1	24
20	3"x6"	7'-8"	2	16'-0"	1	24
				Total F.B.M.		1785

HARDWARE

No.	Item	Size
212	Split Rings	4" ϕ
2	Machine Bolts	3/4" x 9 1/2"
24	" "	3/4" x 12 1/2"
66	" "	3/4" x 14 1/2"
184	Cut Washers	3" x 3" x 3/16"

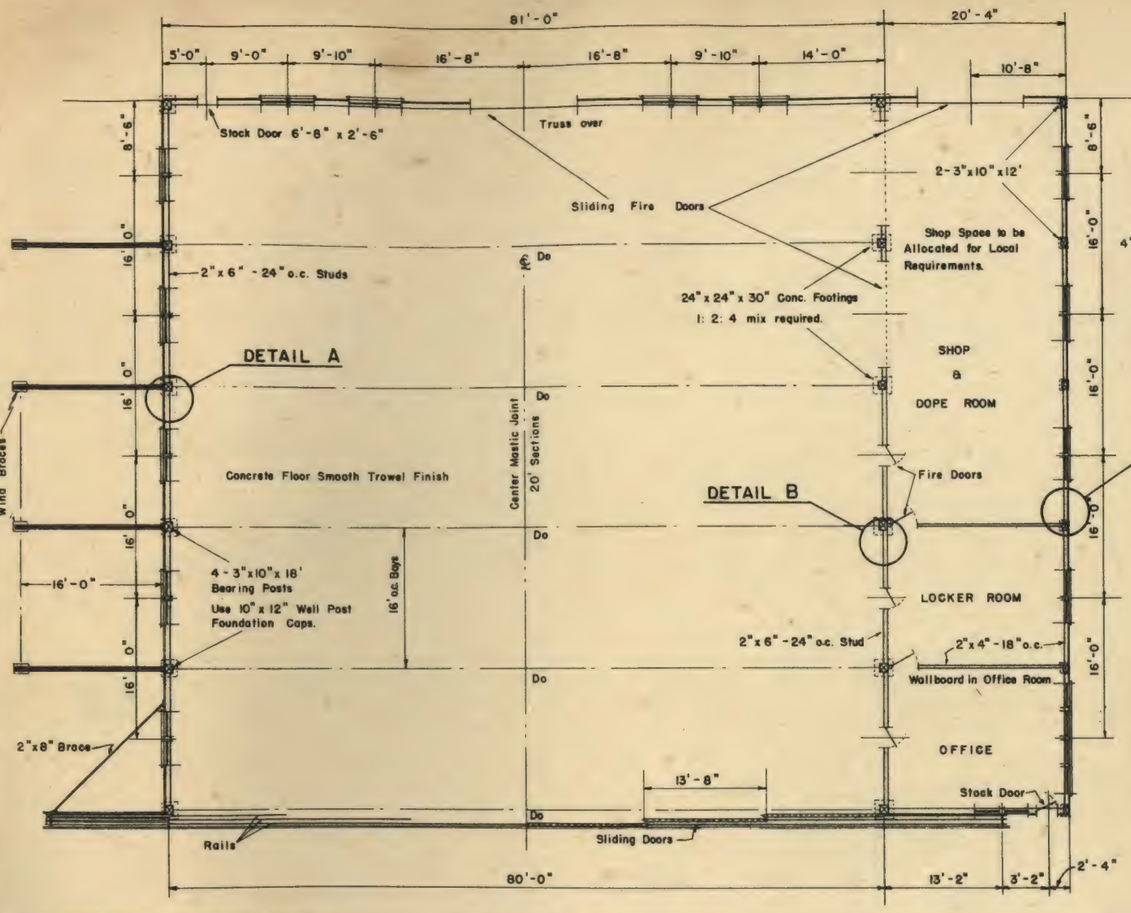
CIVIL AERONAUTICS AUTHORITY
BUREAU OF FEDERAL AIRWAYS – TECHNICAL DEVELOPMENT DIVISION
AIRPORT SECTION

FRAME HANGAR 60' SPAN
TRUSS DETAIL

REV.	APPROVED: A. B. M. Sullen, SECTION CHIEF		
11/15/50	REVIEWED: Chas. B. Brookman, SR. ENGINEER		
	SUBMITTED: E. M. Ellington		
	T.E.C.O. WASH. D.C.	DRAWN BY: J. CARR	
	DATE 4/14/39 NTS	SHEET 2	DR. NO. 100

Rev. N.M. J.H.C. 11/29/50

1942-7

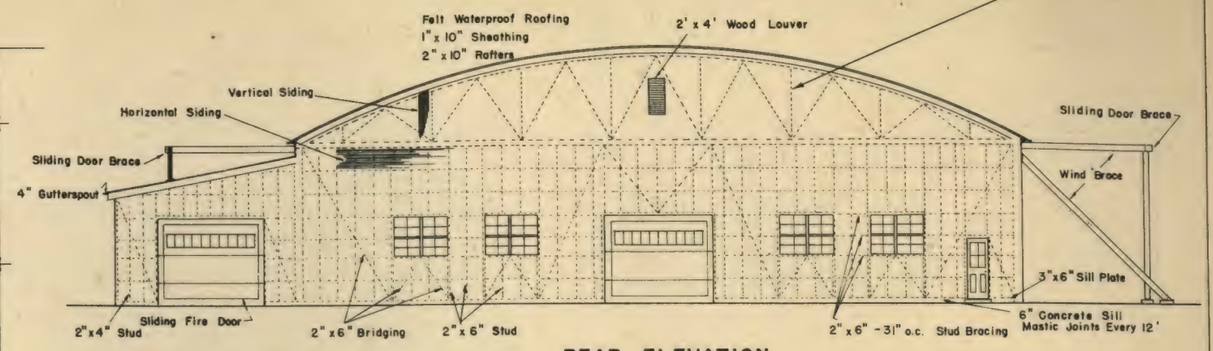


Mfr. To Furnish Drawings For Door Runner Installation.

PLAN

See Sheet 2 for MATERIAL LIST

See Sheet 4 for TRUSS DETAIL



REAR ELEVATION
BRACING DIAGRAM

All Walls of Corrugated Metal Siding Except Lean-To.

NOTE: REAR HANGAR DOOR OPTIONAL.

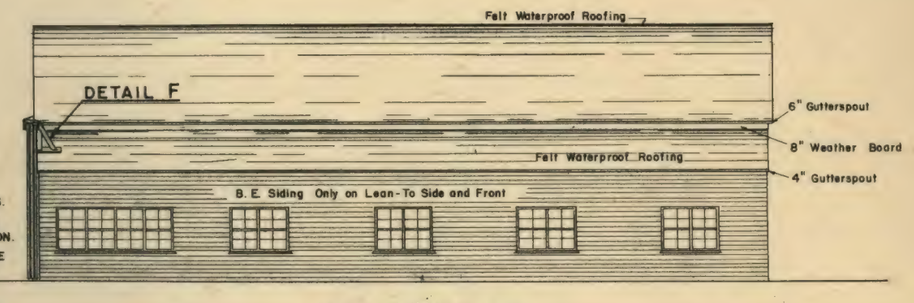
NOTE: STUDS SHALL BE DOUBLED AND BRIDGED AROUND ALL OPENINGS.

MULLION DOUBLED HUNG WINDOWS.

FRAMES ARE PRIMED AND SASH WATERPROOFED BEFORE ERECTION.

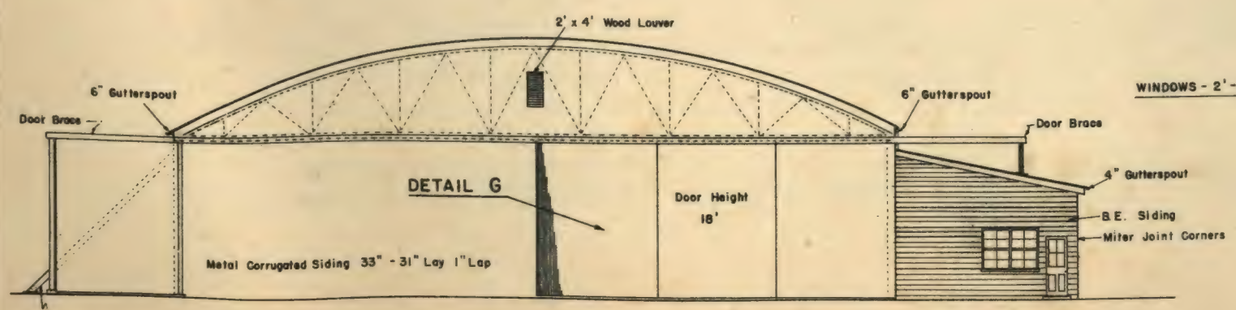
DRAINS AND DOWNSPOUTS TO BE PLACED TO SUIT LOCAL REQUIREMENTS.

EARTH SHALL BE WELL TAMPED AROUND ALL CONCRETE WORK.



SIDE ELEVATION
LEAN-TO

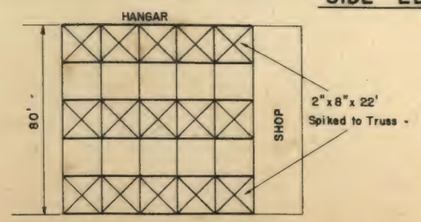
See Sheet 2 & 3 for DETAILS



FRONT ELEVATION

WINDOWS - 2'-10½" x 4'-6" Units

SIDE ELEVATION



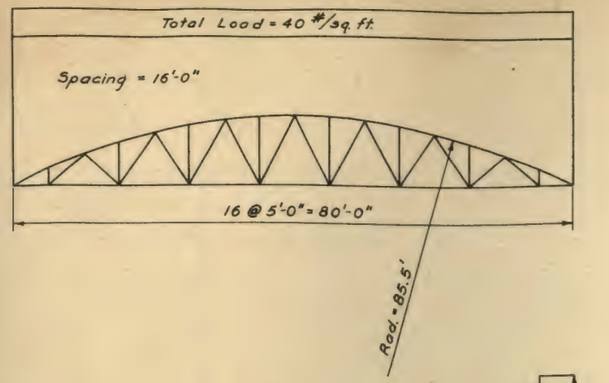
BAY BRACING DIAGRAM

SCALE: 1/8" = 1'-0"

CIVIL AERONAUTICS AUTHORITY
BUREAU OF FEDERAL AIRWAYS - TECHNICAL DEVELOPMENT DIVISION
AIRPORT SECTION

WOOD FRAME HANGAR
SIZE 80' x 80'

REV.	APPROVED: A B McMullen, SECTION CHIEF	
	REVIEWED: Charles B Donaldson, SR. ENGINEER	
	SUBMITTED: Charles B. Donaldson	
	CHECKED:	DRAWN BY: H.P. Beach, Jr., ARCH.
	DATE: 7-18-40	SHEET - One / DR. No. 179



NOTES

Top chord members are built up to the desired curvature with 2"x4" lumber, glued with casein glue and nailed from both sides with 60 d spikes spaced 12" o.c. and in a staggered position about 1" from the edge. This nailing will assist in holding the members in position while the glue is setting up. Laminations are further reinforced at the panel points by a ½" through bolt.

In fabrication and assembly, lay out truss as shown. Cut web members off to fit truss, then bore all holes for bolts. Disassembl truss and cut connector grooves. Reassemble truss with connectors in place. Finally lift into place with a gin pole or crane.

Trusses must be properly braced laterally with "X" braces attached to the verticals 20' o.c.

SPECIFICATIONS

LUMBER

Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq in. as follows:

880# Compression parallel to grain
1200# Extreme fiber in bending
1,600,000# Modulus of elasticity

TIMBER CONNECTORS

Split ring connectors shall be made of mild steel, 2½" inside diameter, ¾" in depth, .163" thickness at center beveling to .143" at edges, and having a load capacity, with a ½" bolt, of 2850# parallel to grain.

Shear plate connectors shall be made of malleable iron, 4" in diameter, .20" thickness of plate, .62" depth of flange, .81" diameter of bolt hole, and having a load capacity, with a ¾" bolt, of 5080# parallel to grain.

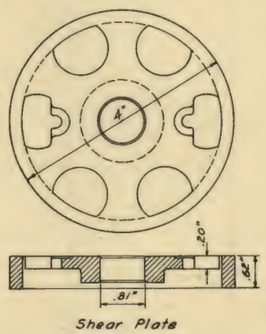
MATERIALS LIST PER TRUSS

Lumber (S4S)

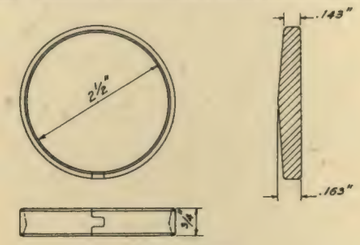
Memb.	Size	Length	Make	Cut From	Order	Ft.B.M.
Top Chord	2"x4"	1050'		Random		700
Bottom Chord	4"x8"	19'-6"	4	20'-0"	4	214
Bottom Chord	4"x8"	20'-0"	4	20'-0"	4	214
Splice Plates	4"x8"	6'-8"	9	20'-0"	3	160
End Fill	4"x8"	4'-9"	2	10'-0"	1	27
V_1	4"x4"	3'-4"	2	14'-0"	2	38
V_2	4"x4"	6'-10"	2	14'-0"	1	19
V_3	4"x4"	9'-2"	2	See V_1		
V_4	4"x4"	10'-3	2	20'-0"	2	54
D_1	4"x4"	7'-0"	2	14'-0"	1	19
D_2	4"x4"	7'-0"	2	14'-0"	1	19
D_3	4"x4"	9'-5"	2	See V_4		
D_4	4"x4"	9'-5"	2	20'-0"	1	27
D_5	4"x4"	11'-0"	2	12'-0"	2	32
D_6	4"x4"	11'-0"	2	12'-0"	2	32
D_7	4"x4"	11'-5"	2	12'-0"	2	32
				Total		1587

Hardware

No.	Item	Size
208	Split Rings	2½"ϕ
20	Mall. Iron Sh. Pl.	4"ϕ
34	Machine Bolts	½"x11"
44	" "	½"x12"
30	" "	½"x19"
10	" "	¾"x13"
216	Plate Washers	2"x2"x⅛"
2	Steel Straps	⅜"x9"x10'-5"
	Glue & Nails as required	

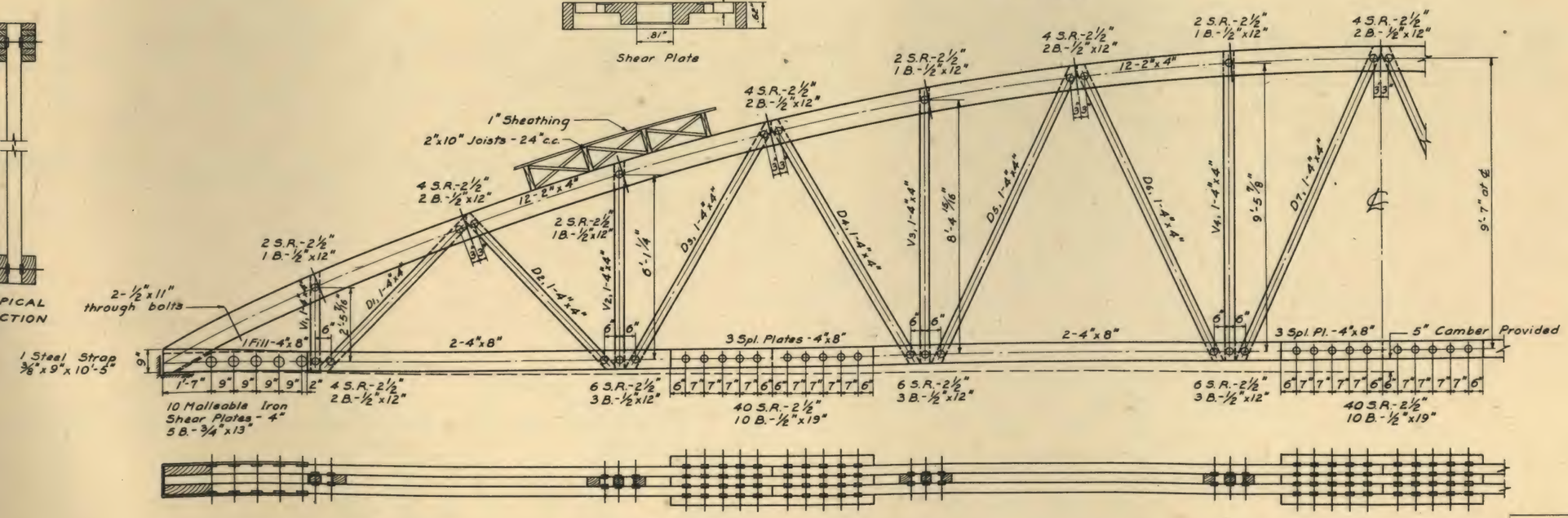


Shear Plate



Split Ring

TYPICAL SECTION



WOOD BOWSTRING HANGAR ROOF TRUSS

SPAN - 80'-0" RISE - 10'-0" SPACING - 16'-0"

Scale: ½" = 1'-0"

CIVIL AERONAUTICS AUTHORITY
BUREAU OF FEDERAL AIRWAYS—TECHNICAL DEVELOPMENT DIVISION
AIRPORT SECTION

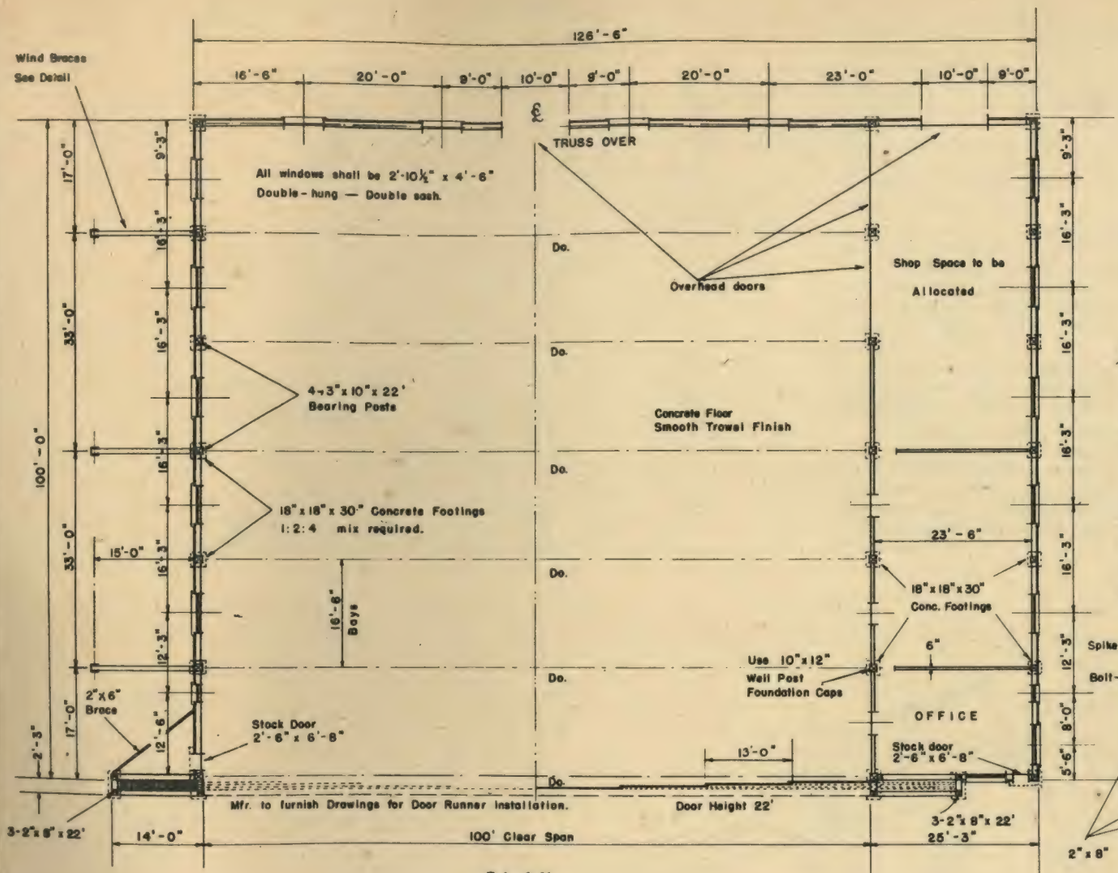
WOOD FRAME HANGAR SIZE 80' x 80'

REV.			
	APPROVED: A B McMullen	, SECTION CHIEF	
	REVIEWED: Charles B Donaldson	, SR. ENGINEER	
	SUBMITTED: Charles B Donaldson		
	CHECKED: J.H.C.	DRAWN BY: Carr	
	DATE: 7 - 18 - 40	SHEET 4	DR. NO. 179

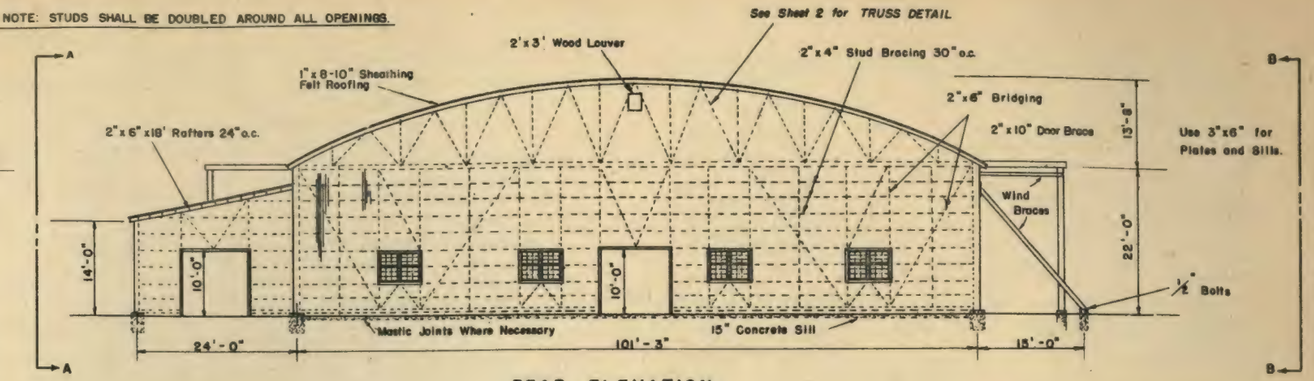
Revised N.M. 12/16/39 J.H.C.

11645

NOTE: STUDS SHALL BE DOUBLED AROUND ALL OPENINGS.

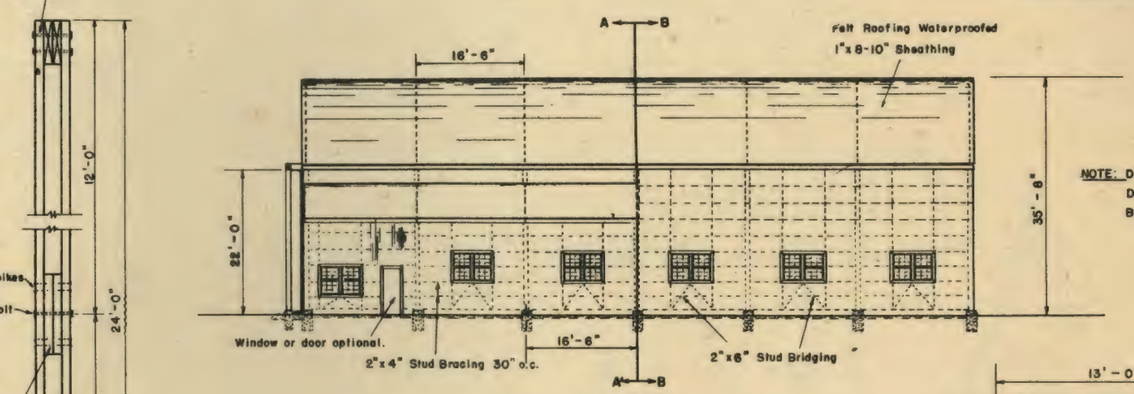


PLAN



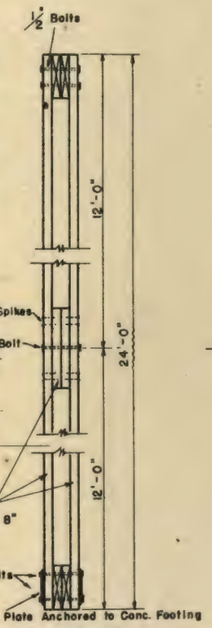
REAR ELEVATION

NOTE: Rear Hangar Door Optional



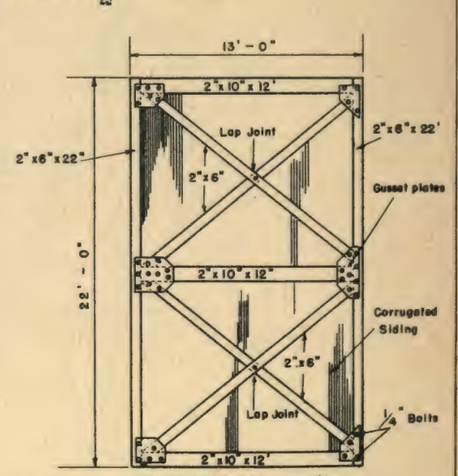
SIDE ELEVATION

NOTE: Door Runner Installation Drawings to be furnished By Manufacturer.



WIND BRACE DETAIL

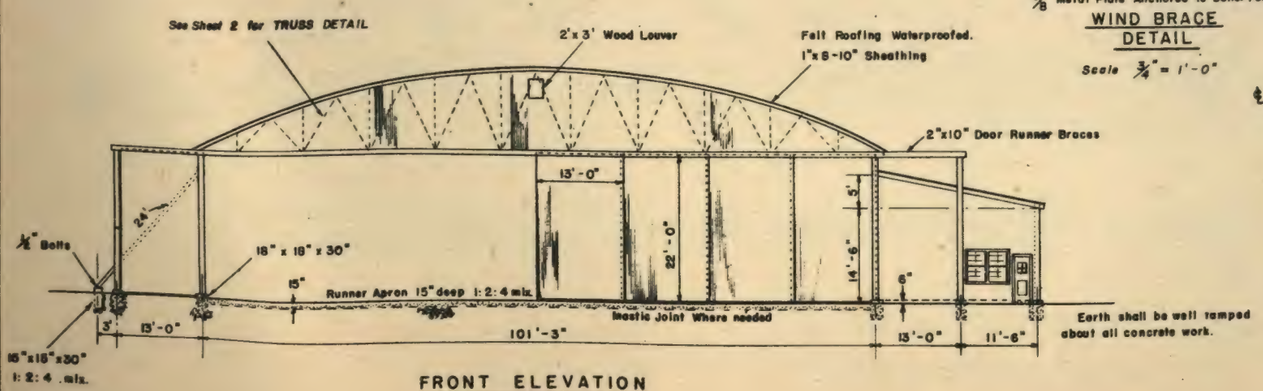
Scale ¾" = 1'-0"



SLIDING DOOR DETAIL

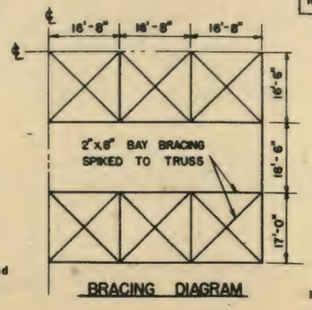
Scale: ¼" = 1'-0"

This hangar requires approximately 40,000 bd. ft. of lumber exclusive of trusses. All truss details and lumber lists will be found on sheet 2.



FRONT ELEVATION

Scale: 3/32" = 1'-0"



BRACING DIAGRAM

HARDWARE

16 – Double Sash - Double Hung Windows 2'-10½" x 4'-6"
2 – Single " " "
2 – Stock Panel Doors 2'-6" x 6'-8"
340 – Cement Bags - 26 cu.yds of Sand. - 65 cu. yds. Stone Aggregate.
11,000 – Ft. of Gal. Corrugated Siding.
15 – ½ Bolts
7 – 9" x 10" Foundation Caps.
14 – 10" x 12" " "

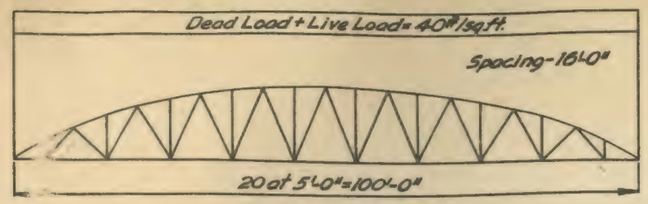
This list does not include all hardware.

CIVIL AERONAUTICS AUTHORITY
BUREAU OF FEDERAL AIRWAYS – TECHNICAL DEVELOPMENT DIVISION
·AIRPORT SECTION·

FRAME HANGAR 100' x 100'

REV.	APPROVED: A. B. McMullen	SECTION CHIEF
6/12/39	REVIEWED: Robert B. Donald	SR. ENGINEER
6/15/39	SUBMITTED: E. A. Bergeson	AIRPORT ENGINEER
		DRAWN BY: H. P. Beach, Jr.
	DATE: 5/15/39	SHEET: 1 DR. NO. 120

40824



NOTES

Top chord members are built up to the desired curvature with 2"x4" lumber, glued with casein glue, and nailed, at the same time with 20d spikes, spaced 12" o.c. and in a staggered position, about 1" from each edge. This nailing will assist in holding members in position while the glue is setting up. Laminations are further reinforced at panel points by a through bolt, 1/2" in diameter.

In fabrication and assembly, lay out truss as shown. Cut web members off to fit truss, then bore all holes for bolts. Disassemble truss and cut connector grooves. Reassemble truss with connectors in place. Finally lift into place with a gin pole or crane.

Trusses must be properly braced against each other with "X" braces attached to verticals 25' o.c.

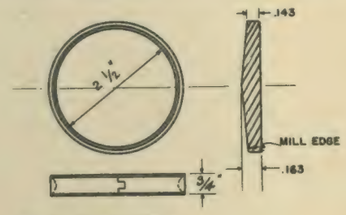
This truss as shown has a parabolically shaped top chord. If a circular segment is desired, the only changes necessary will be an uninfluential change in the stress diagram, a change of the lumber list and of the vertical dimensions.

SPECIFICATIONS

LUMBER-Lumber shall be of a structural grade with minimum allowable working stresses in lbs. per sq. in. as follows:

880# Compression parallel to grain.
1,200# Extreme fiber in bending.
1,600,000# Modulus of elasticity.

TIMBER CONNECTORS- Split ring connectors shall be made of mild steel, 2 1/2" inside diameter; 3/4" in depth, .153" in thickness, and having a load capacity, with a 1/2" diameter bolt, of 2850# parallel to grain.



SPLIT RING DETAIL

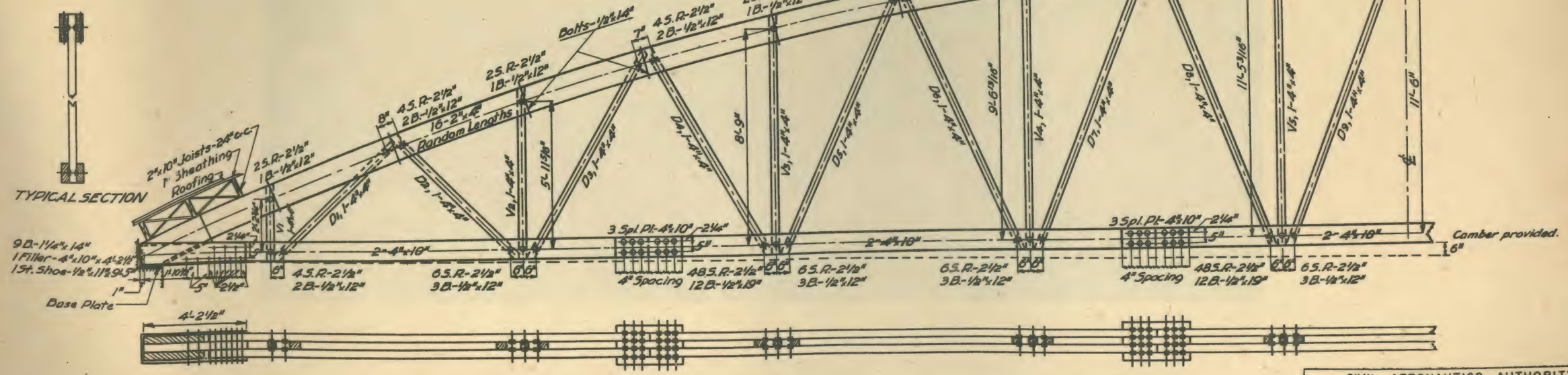
Lumber Cutting Bill

Mark	Size	Length	Marks	Cut Ft.	Order	Ft. B.M.	Mark	Size	Length	Marks	Cut Ft.	Order	Ft. B.M.
Top Chord Laps	2"x4"	17'-0"		Random		113.4	D1	4"x4"	7'-0"	2	14'	1	19
Bottom Chord	4"x10"	20'-0"	10	20'	10	667	D2	4"x4"	7'-0"	2	14'	1	19
Top Chord Splices	4"x10"	5'-0"	2	10'	1	34	D3	4"x4"	10'-0"	2	10'	2	27
	4"x10"	24'-0"	12	12'	3	120	D4	4"x4"	10'-0"	2	10'	2	27
V1	4"x4"	3'-9"	2	Scrap	0	0	D5	4"x4"	12'-0"	2	12'	2	32
V2	4"x4"	7'-0"	2	14'	1	19	D6	4"x4"	12'-0"	2	12'	2	32
V3	4"x4"	10'-0"	2	10'	2	27	D7	4"x4"	13'-0"	2	14'	2	38
V4	4"x4"	12'-0"	2	12'	2	32	D8	4"x4"	13'-0"	2	14'	2	38
V5	4"x4"	12'-6"	2	18'	2	48	D9	4"x4"	14'-0"	2	14'	2	38

Total Ft. B.M. - 2346

Hardware

No.	Item	Size	No.	Item	Size
304	Split Rings	2 1/2" ø	42	Machine Bolts	1/2"x14"
56	Machine Bolts	1/2"x12"	2	Steel Shoes	1/2"x11"x9.5"
48	" "	1/2"x19"	292	Cut Washers for 1/2" B.	
18	" "	1 1/4"x14"		Glue & Nails as reqd.	



WOOD BOWSTRING HANGAR ROOF TRUSS

SPAN-100'-0", RISE-12'-0", SPACING-16'-0"

Scale: 1/2" = 1'-0"

(Bowstring trusses of this type and system of construction are readily applicable to spans from 60'-180')

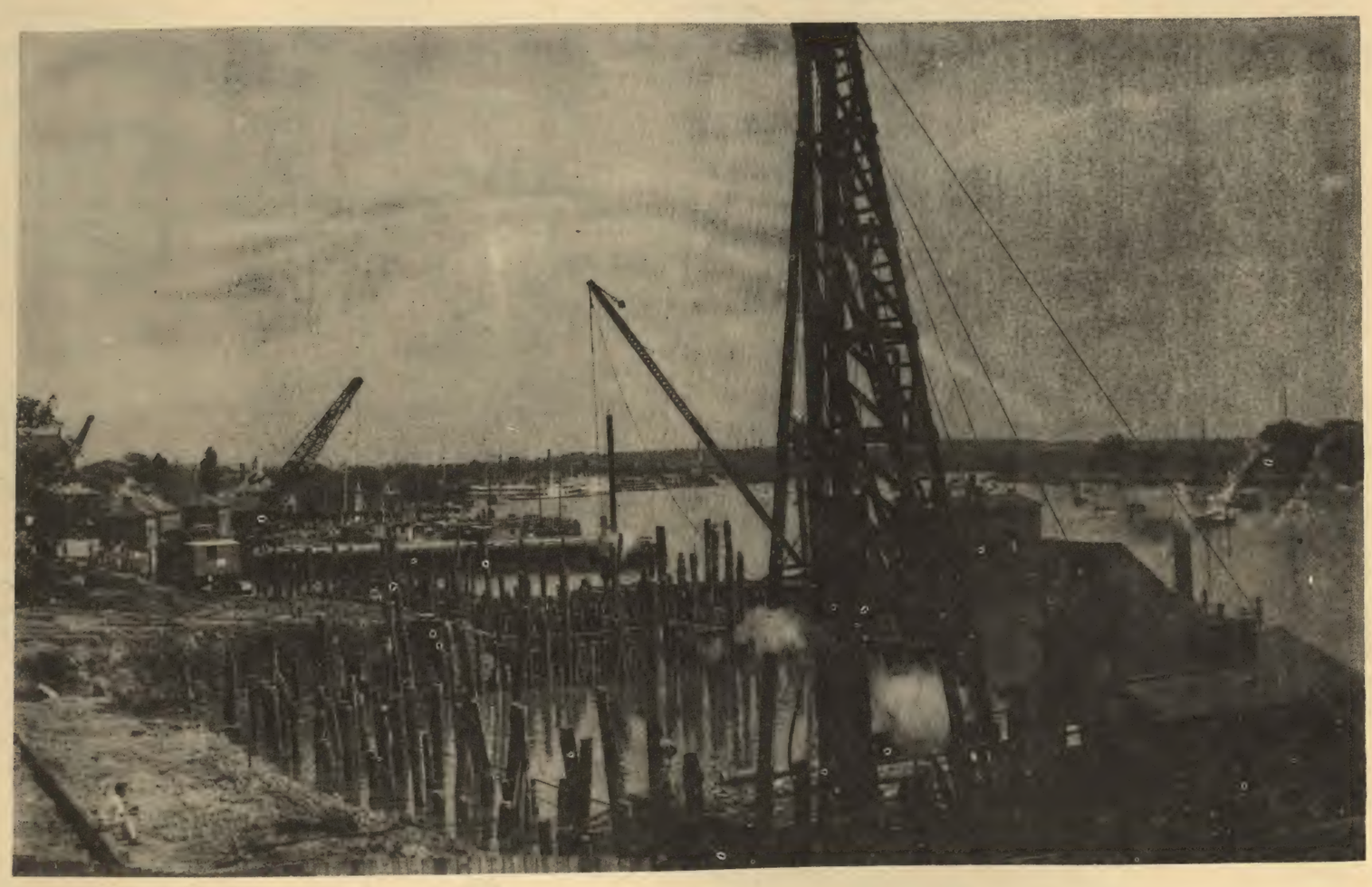
CIVIL AERONAUTICS AUTHORITY
BUREAU OF FEDERAL AIRWAYS — TECHNICAL DEVELOPMENT DIVISION
AIRPORT SECTION

FRAME HANGAR - TRUSS DETAIL
100 Ft.

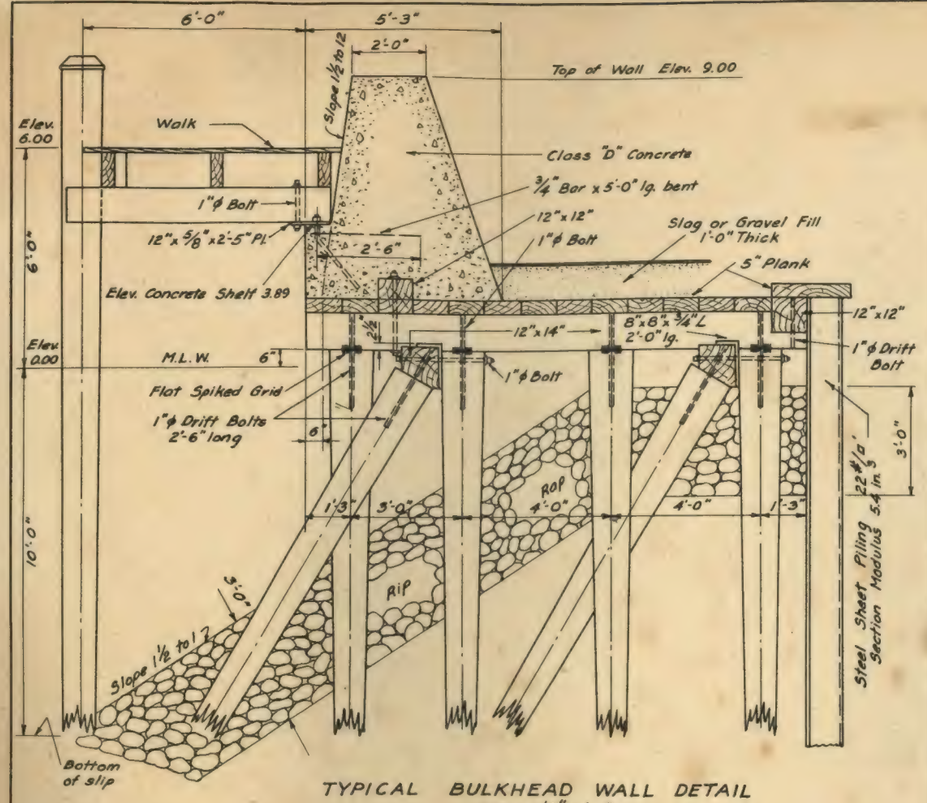
REV	APPROVED A. R. W. Mullen	SECTION CHIEF
	REVIEWED Charles B. Donaldson	SR. ENGINEER
	SUBMITTED E. M. Ellington	
	T.E.CO.	DRAWN BY: CARR
	DATE 5/15/39	SHEET 2 — DR. No. 120

#10824

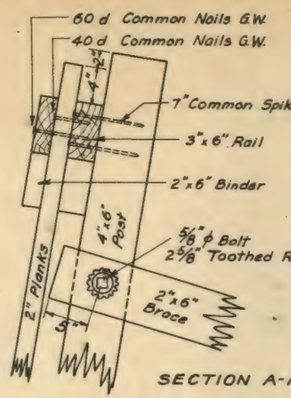
MISCELLANEOUS DESIGNS



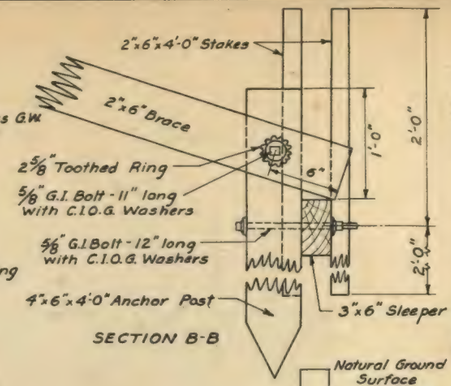
USES: Miscellaneous designs cover many additional possibilities on the use of lumber as a structural material. Within reasonable limits, any structural frame can be properly engineered and constructed of timber with economy.



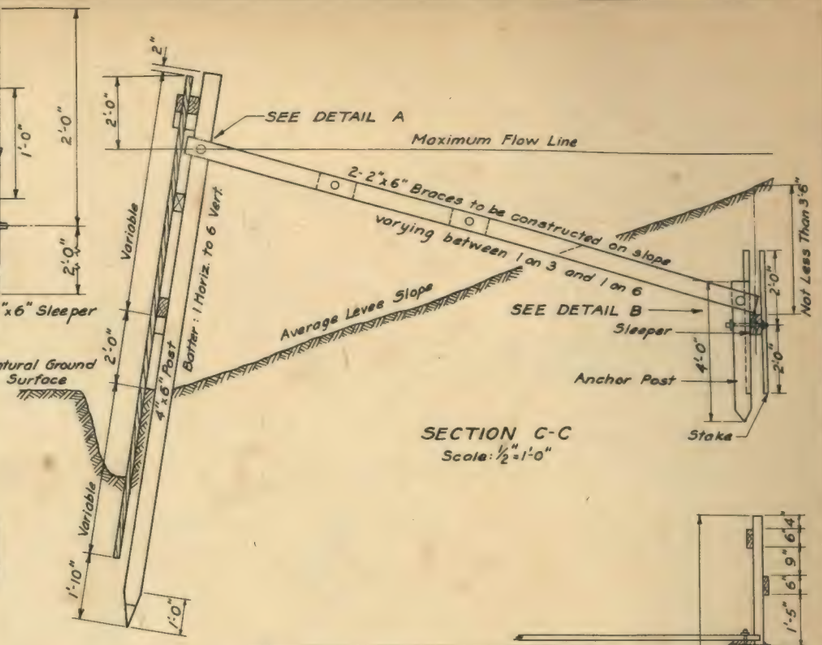
TYPICAL BULKHEAD WALL DETAIL
Scale: ½" = 1'-0"



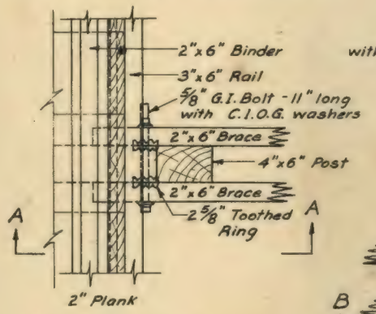
SECTION A-A



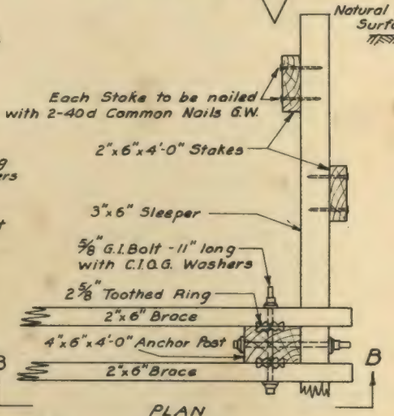
SECTION B-B



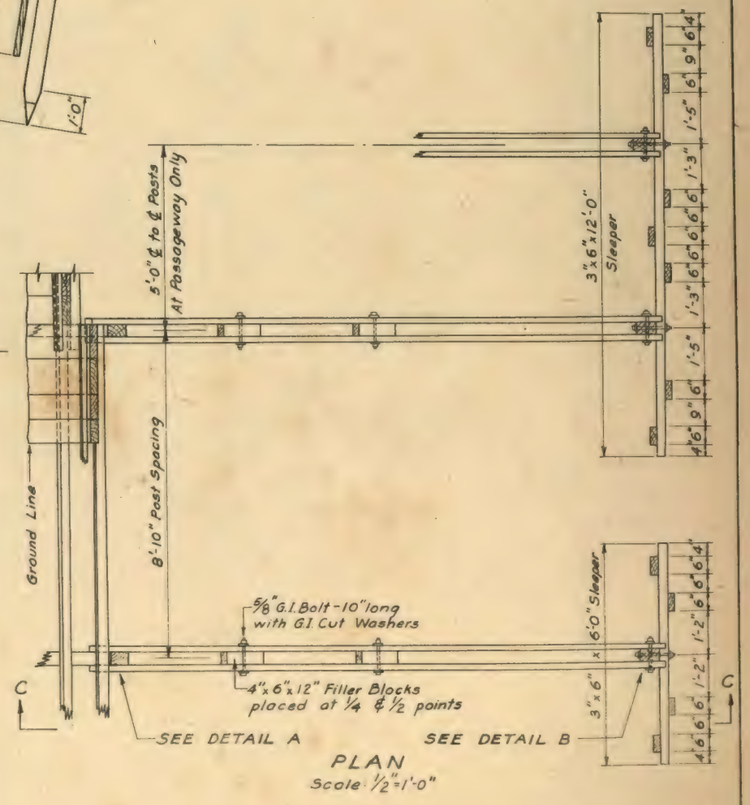
SECTION C-C
Scale: ½" = 1'-0"



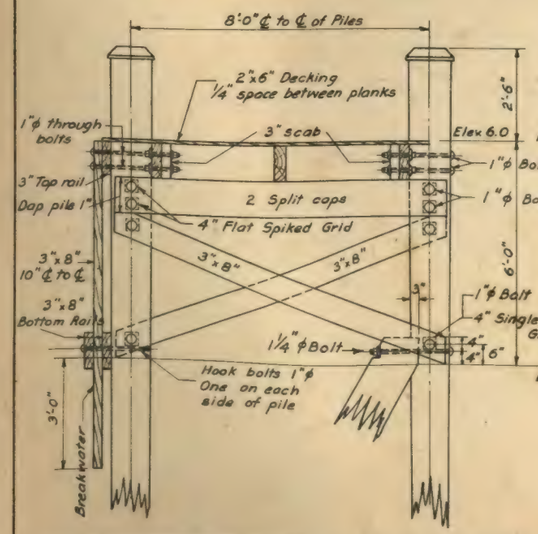
PLAN
DETAIL A Scale: 1½" = 1'-0"

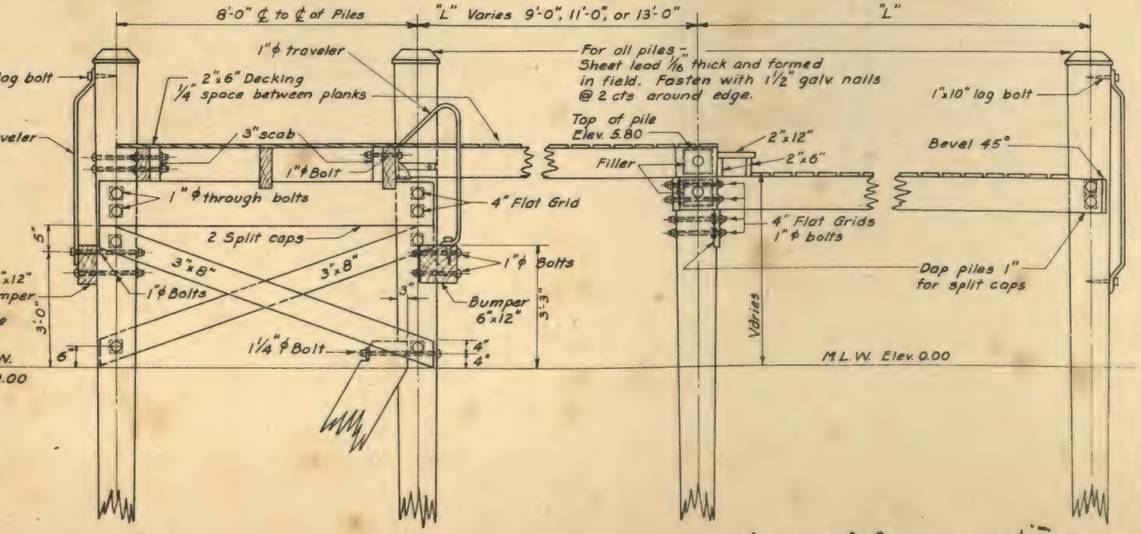


PLAN
DETAIL B



PLAN
Scale: ½" = 1'-0"





ELEVATION - 8 FT. WALK AND CATWALKS
Scale: ½" = 1'-0"

This design is based upon plans for bulkhead walls, docks and wall structures, as outlined in "Marinas - Recommendations for Design, Construction and Maintenance" published by the National Association of Engine and Boat Manufacturers

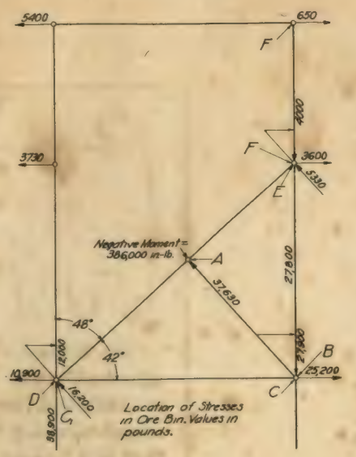
TYPICAL REVETMENT DETAILS

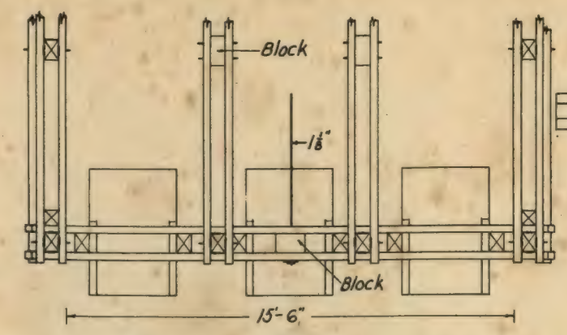
SPLIT RING | TOOTHED RING | FLAT GRID | SINGLE CURVED GRID | DOUBLE CURVED GRID | CIRCULAR GRID

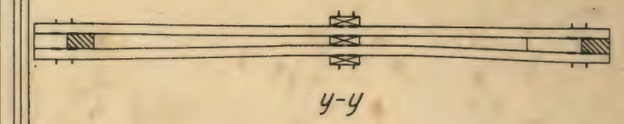
TIMBER ENGINEERING COMPANY
WASHINGTON, D. C.

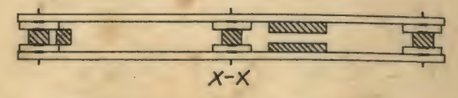
WHARF AND REVETMENT DETAILS

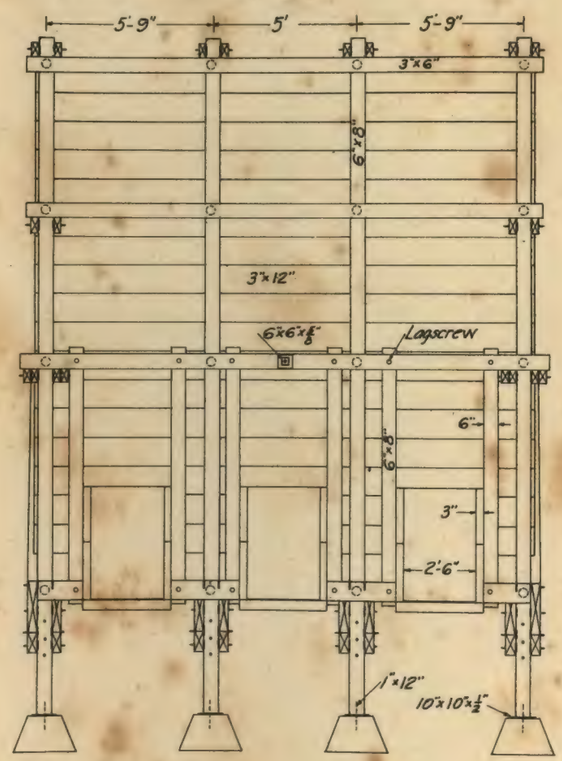
SCALE As Noted SHEET 1 OF 1	
DRAWN BY J.H.C. DATE 4/5/40	DRAWING NO.
DESIGNED BY	274
CHECKED BY	
TRACED BY D.S.H. 4/27/40	

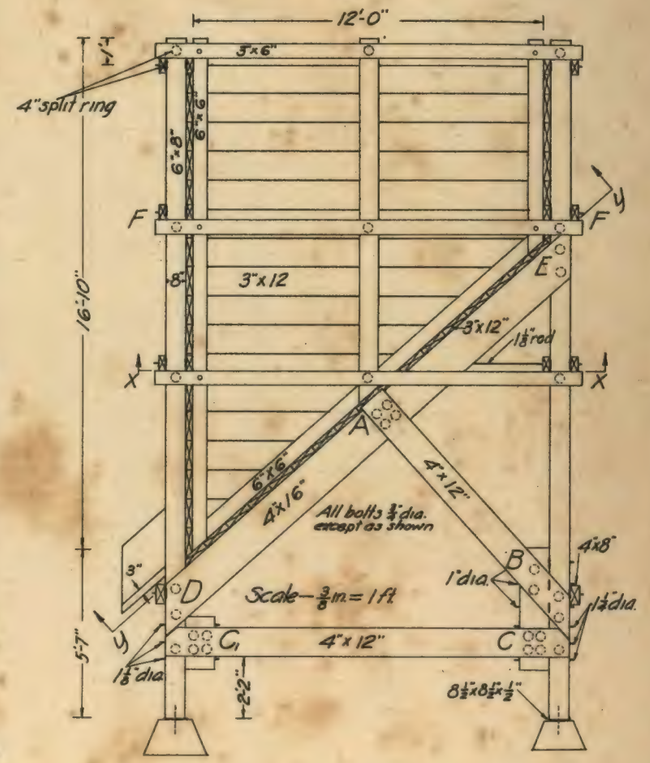


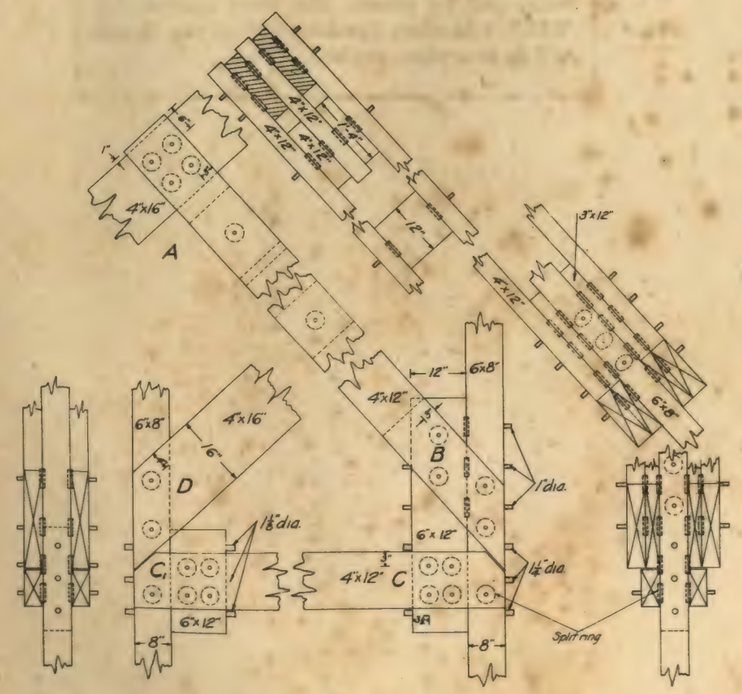


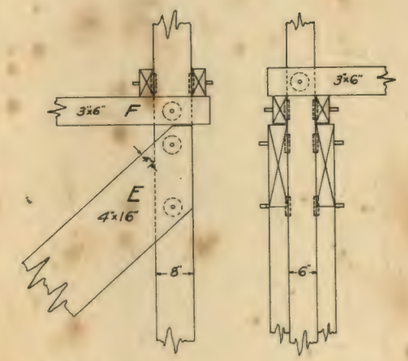












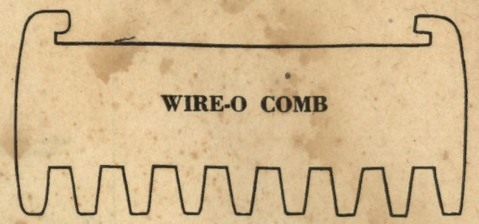
All bolts ¾" dia. except as shown; ¾"x3½" OG washers. Use 1⅛"x5" washers with 1⅛" and 1½" bolts.

TIMBER ENGINEERING CO.
1337 CONNECTICUT AVENUE
WASHINGTON D.C.

TECO CONNECTED ORE BIN

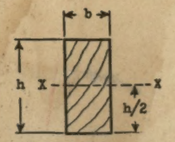
DRAWINGS - COURTESY OF
PROF. W. W. STALEY
UNIV. OF IDAHO

DATE OF ISSUE - NOV. 1 1939



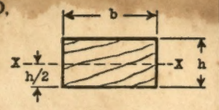
The illustrated "Comb" which you will find attached to the WIRE-O binding at this page, is furnished for your convenience in inserting supplementary typical designs and data sheets that will be sent you at intervals as developed. These sheets will be punched with a slotted hole, and by placing the sheet against the WIRE-O binding, combing lightly, the sheets will fit into place perfectly.

HANDY TABLES FOR USE IN TIMBER DESIGN



PROPERTIES OF CERTAIN* AMERICAN STANDARD BOARD, PLANK, DIMENSION, AND TIMBER DRESSED (S4S) SIZES

Moment of Inertia and Section Modulus are given with respect to X — X axis with dimensions b and h as shown on sketch.



Nominal Size b In Inches h	American Standard Dressed Size (S4S) b In Inches h	Area of Section A=bh Sq. In.	Moment of Inertia $I=\frac{bh^3}{12}$	Section Modulus $S=\frac{bh^2}{6}$	Board Feet Per Linear Foot of Piece	Weight in Pounds Per Linear Foot of Piece When Weight of Wood Per Cubic Foot Equals					
						25 lb.	30 lb.	35 lb.	40 lb.	45 lb.	50 lb.
2 x 2	1⅝x 1⅝	2.64	.58	.72	⅓	.5	.6	.6	.7	.8	.9
2 x 4	1⅝x 3⅝	5.89	6.45	3.56	⅔	1.0	1.2	1.4	1.6	1.8	2.0
2 x 6	1⅝x 5⅝	9.14	24.10	8.57	1	1.6	1.9	2.2	2.5	2.9	3.2
2 x 8	1⅝x 7½	12.19	57.13	15.23	1⅓	2.1	2.5	3.0	3.4	3.8	4.2
2 x10	1⅝x 9½	15.44	116.10	24.44	1⅔	2.7	3.2	3.8	4.3	4.8	5.4
2 x12	1⅝x11½	18.69	205.95	35.82	2	3.2	3.9	4.5	5.2	5.8	6.5
2 x14	1⅝x13½	21.94	333.18	49.36	2⅓	3.8	4.6	5.3	6.1	6.9	7.6
3 x 4	2½x 3½	9.52	10.42	5.75	1	1.7	2.0	2.3	2.6	3.0	3.3
3 x 6	2½x 5½	14.77	38.93	13.84	1½	2.6	3.1	3.6	4.1	4.6	5.1
3 x 8	2½x 7½	19.69	92.29	24.61	2	3.4	4.1	4.8	5.5	6.2	6.8
3 x10	2½x 9½	24.94	187.55	39.48	2½	4.3	5.2	6.1	6.9	7.8	8.7
3 x12	2½x11½	30.19	332.69	57.86	3	5.2	6.3	7.3	8.4	9.4	10.5
3 x14	2½x13½	35.44	538.21	79.73	3½	6.2	7.4	8.6	9.8	11.1	12.3
3 x16	2½x15½	40.69	814.60	105.11	4	7.1	8.5	9.9	11.3	12.7	14.1
4 x 1	3½x 13/16	2.83	.14	.37	⅓	.5	.6	.7	.8	.9	1.0
4 x 2	3½x 1½	5.89	1.30	1.60	⅔	1.0	1.2	1.4	1.6	1.8	2.0
4 x 4	3½x 3½	13.14	14.39	7.94	1⅓	2.3	2.7	3.2	3.7	4.1	4.6
4 x 6	3½x 5½	20.39	53.76	19.12	2	3.5	4.2	5.0	5.7	6.4	7.1
4 x 8	3½x 7½	27.19	127.44	33.98	2⅔	4.7	5.7	6.6	7.6	8.5	9.4
4 x10	3½x 9½	34.44	259.00	54.53	3⅓	6.0	7.2	8.4	9.6	10.8	12.0
4 x12	3½x11½	41.69	459.43	79.90	4	7.2	8.7	10.1	11.6	13.0	14.5
4 x14	3½x13½	48.94	743.24	110.11	4⅔	8.5	10.2	11.9	13.6	15.3	17.0
4 x16	3½x15½	56.19	1124.92	145.15	5⅓	9.8	11.7	13.7	15.6	17.6	19.5
6 x 1	5½x 13/16	4.40	.22	.57	½	.8	.9	1.1	1.2	1.4	1.5
6 x 2	5½x 1½	9.14	2.01	2.48	1	1.6	1.9	2.2	2.5	2.9	3.2
6 x 4	5½x 3½	20.39	22.33	12.32	2	3.5	4.2	5.0	5.7	6.4	7.1
6 x 6	5½x 5½	30.25	76.26	27.73	3	5.3	6.3	7.4	8.4	9.5	10.5
6 x 8	5½x 7½	41.25	193.36	51.56	4	7.2	8.6	10.0	11.5	12.9	14.3
6 x10	5½x 9½	52.25	392.96	82.73	5	9.1	10.9	12.7	14.5	16.3	18.1
6 x12	5½x11½	63.25	697.07	121.23	6	11.0	13.2	15.4	17.6	19.8	22.0
6 x14	5½x13½	74.25	1127.67	167.06	7	12.9	15.5	18.0	20.6	23.2	25.8
6 x16	5½x15½	85.25	1706.78	220.23	8	14.8	17.8	20.7	23.7	26.6	29.6
6 x18	5½x17½	96.25	2456.38	280.73	9	16.7	20.1	23.4	26.7	30.1	33.4
8 x 1	7½x 13/16	5.86	.30	.76	⅔	1.0	1.2	1.4	1.6	1.8	2.0
8 x 2	7½x 1½	12.19	2.68	3.30	1⅓	2.1	2.5	3.0	3.4	3.8	4.2
8 x 4	7½x 3½	27.19	29.77	16.43	2⅔	4.7	5.7	6.6	7.6	8.5	9.4
8 x 6	7½x 5½	41.25	103.98	37.81	4	7.2	8.6	10.0	11.5	12.9	14.3
8 x 8	7½x 7½	56.25	263.67	70.31	5⅓	9.8	11.7	13.7	15.6	17.6	19.5
8 x10	7½x 9½	71.25	535.86	112.81	6⅔	12.4	14.8	17.3	19.8	22.3	24.7
8 x12	7½x11½	86.25	950.55	165.31	8	15.0	18.0	21.0	24.0	27.0	29.9
8 x14	7½x13½	101.25	1537.73	227.81	9⅓	17.6	21.1	24.6	28.1	31.6	35.2
8 x16	7½x15½	116.25	2327.42	300.31	10⅔	20.2	24.2	28.3	32.3	36.3	40.4
8 x18	7½x17½	131.25	3349.61	382.81	12	22.8	27.3	31.9	36.5	41.0	45.6
8 x20	7½x19½	146.25	4634.30	475.31	13⅓	25.4	30.5	35.5	40.6	45.7	50.8
10x 1	9½x 13/16	7.42	.38	.97	5/6	1.3	1.5	1.8	2.1	2.3	2.6
10x 2	9½x 1½	15.44	3.40	4.18	1⅔	2.7	3.2	3.8	4.3	4.8	5.4
10x 4	9½x 3½	34.44	37.71	20.81	3⅓	6.0	7.2	8.4	9.6	10.8	12.0
10x10	9½x 9½	90.25	678.76	142.90	8⅓	15.7	18.8	21.9	25.1	28.2	31.3
10x12	9½x11½	109.25	1204.03	209.40	10	19.0	22.8	26.6	30.3	34.1	37.9
10x14	9½x13½	128.25	1947.80	288.56	11⅔	22.3	26.7	31.2	35.6	40.1	44.5
10x16	9½x15½	147.25	2948.07	380.40	13⅓	25.6	30.7	35.8	40.9	46.0	51.1
10x18	9½x17½	166.25	4242.84	484.90	15	28.9	34.6	40.4	46.2	52.0	57.7
10x20	9½x19½	185.25	5870.11	602.06	16⅔	32.2	38.6	45.0	51.5	57.9	64.3
10x24	9½x23½	223.25	10274.15	874.40	20	38.8	46.5	54.3	62.0	69.8	77.5
12x 1	11½x 13/16	8.98	.46	1.17	1	1.6	1.9	2.2	2.5	2.8	3.1
12x 2	11½x 1½	18.69	4.11	5.06	2	3.2	3.9	4.5	5.2	5.8	6.5
12x 4	11½x 3½	41.69	45.65	25.19	4	7.2	8.7	10.1	11.6	13.0	14.5
12x 6	11½x 5½	63.25	159.44	57.98	6	11.0	13.2	15.4	17.6	19.8	22.0
12x12	11½x11½	132.25	1457.51	253.48	12	23.0	27.6	32.1	36.7	41.3	45.9
12x14	11½x13½	155.25	2357.86	349.31	14	27.0	32.3	37.7	43.1	48.5	53.9
12x16	11½x15½	178.25	3568.71	460.48	16	30.9	37.1	43.3	49.5	55.7	61.9
12x18	11½x17½	201.25	5136.07	586.98	18	34.9	41.9	48.9	55.9	62.9	69.9
12x20	11½x19½	224.25	7105.92	728.81	20	38.9	46.7	54.5	62.3	70.1	77.9
12x24	11½x23½	270.25	12437.13	1058.48	24	46.9	56.3	65.7	75.1	84.5	93.8
14x14	13½x13½	182.25	2767.92	410.06	16⅓	31.6	38.0	44.3	50.6	57.0	63.3
14x16	13½x15½	209.25	4189.36	540.56	18⅔	36.3	43.6	50.9	58.1	65.4	72.7
14x20	13½x19½	263.25	8341.73	855.56	23⅓	45.7	54.8	64.0	73.1	82.3	91.4
14x24	13½x23½	317.25	14600.11	1242.56	28	55.1	66.1	77.1	88.1	99.1	110.2
16x16	15½x15½	240.25	4810.01	620.65	21⅓	41.7	50.1	58.4	66.7	75.1	83.4
16x20	15½x19½	302.25	9577.55	982.31	26⅔	52.6	63.1	73.6	84.1	94.6	105.1
16x24	15½x23½	364.25	16763.09	1426.65	32	63.2	75.9	88.5	101.2	113.8	126.5
18x18	17½x17½	306.25	7815.76	893.23	27	53.2	63.8	74.4	85.1	95.7	106.3
18x20	17½x19½	341.25	10813.36	1109.06	30	59.2	71.1	82.9	94.8	106.6	118.5
18x24	17½x23½	411.25	18926.07	1610.73	36	71.4	85.7	100.0	114.2	128.5	142.8
20x20	19½x19½	380.25	12049.17	1235.81	33⅓	66.0	79.2	92.4	105.6	118.8	132.0
20x22	19½x21½	419.25	16149.86	1502.31	36⅔	72.8	87.3	101.9	116.5	131.0	145.6
20x24	19½x23½	458.25	21089.05	1794.81	40	79.6	95.5	111.4	127.3	143.2	159.1
22x22	21½x21½	462.25	17806.26	1656.40	40⅓	80.3	96.3	112.4	128.4	144.4	160.5
22x24	21½x23½	505.25	23252.03	1978.90	44	87.7	105.3	122.8	140.3	157.9	175.4
24x24	23½x23½	552.25	25415.01	2162.98	48	95.9	115.1	134.2	153.4	172.6	191.8

DECIMAL EQUIVALENTS

DECIMALS OF A FOOT						DECIMALS OF AN INCH	
FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL
1/16	0.0052	4-1/16	0.3385	8-1/16	0.6719	1/64	0.015625
1/8	0.0104	4-1/8	0.3438	8-1/8	0.6771	1/32	0.03125
3/16	0.0156	4-3/16	0.3490	8-3/16	0.6823	3/64	0.046875
1/4	0.0208	4-1/4	0.3542	8-1/4	0.6875	1/16	0.0625
5/16	0.0260	4-5/16	0.3594	8-5/16	0.6927	5/64	0.078125
3/8	0.0313	4-3/8	0.3646	8-3/8	0.6979	3/32	0.09375
7/16	0.0365	4-7/16	0.3698	8-7/16	0.7031	7/64	0.109375
1/2	0.0417	4-1/2	0.3750	8-1/2	0.7083	1/8	0.125
9/16	0.0469	4-9/16	0.3802	8-9/16	0.7135	9/64	0.140625
5/8	0.0521	4-5/8	0.3854	8-5/8	0.7188	5/32	0.15625
11/16	0.0573	4-11/16	0.3906	8-11/16	0.7240	11/64	0.171875
3/4	0.0625	4-3/4	0.3958	8-3/4	0.7292	3/16	0.1875
13/16	0.0677	4-13/16	0.4010	8-13/16	0.7344	13/64	0.203125
7/8	0.0729	4-7/8	0.4063	8-7/8	0.7396	7/32	0.21875
15/16	0.0781	4-15/16	0.4115	8-15/16	0.7448	15/64	0.234375
1-	0.0833	5-	0.4167	9-	0.7500	1/4	0.250
1-1/16	0.0885	5-1/16	0.4219	9-1/16	0.7552	17/64	0.265625
1-1/8	0.0938	5-1/8	0.4271	9-1/8	0.7604	9/32	0.28125
1-3/16	0.0990	5-3/16	0.4323	9-3/16	0.7656	19/64	0.296875
1-1/4	0.1042	5-1/4	0.4375	9-1/4	0.7708	5/16	0.3125
1-5/16	0.1094	5-5/16	0.4427	9-5/16	0.7760	21/64	0.328125
1-3/8	0.1146	5-3/8	0.4479	9-3/8	0.7813	11/32	0.34375
1-7/16	0.1198	5-7/16	0.4531	9-7/16	0.7865	23/64	0.359375
1-1/2	0.1250	5-1/2	0.4583	9-1/2	0.7917	3/8	0.375
1-9/16	0.1302	5-9/16	0.4635	9-9/16	0.7969	25/64	0.390625
1-5/8	0.1354	5-5/8	0.4688	9-5/8	0.8021	13/32	0.40625
1-11/16	0.1406	5-11/16	0.4740	9-11/16	0.8073	27/64	0.421875
1-3/4	0.1458	5-3/4	0.4792	9-3/4	0.8125	7/16	0.4375
1-13/16	0.1510	5-13/16	0.4844	9-13/16	0.8177	29/64	0.453125
1-7/8	0.1563	5-7/8	0.4896	9-7/8	0.8229	15/32	0.46875
1-15/16	0.1615	5-15/16	0.4948	9-15/16	0.8281	31/64	0.484375
2-	0.1667	6-	0.5000	10-	0.8333	1/2	0.500
2-1/16	0.1719	6-1/16	0.5052	10-1/16	0.8385	33/64	0.515625
2-1/8	0.1771	6-1/8	0.5104	10-1/8	0.8438	17/32	0.53125
2-3/16	0.1823	6-3/16	0.5156	10-3/16	0.8490	35/64	0.546875
2-1/4	0.1875	6-1/4	0.5208	10-1/4	0.8542	9/16	0.5625
2-5/16	0.1927	6-5/16	0.5260	10-5/16	0.8594	37/64	0.578125
2-3/8	0.1979	6-3/8	0.5313	10-3/8	0.8646	19/32	0.59375
2-7/16	0.2031	6-7/16	0.5365	10-7/16	0.8698	39/64	0.609375
2-1/2	0.2083	6-1/2	0.5417	10-1/2	0.8750	5/8	0.625
2-9/16	0.2135	6-9/16	0.5469	10-9/16	0.8802	41/64	0.640625
2-5/8	0.2188	6-5/8	0.5521	10-5/8	0.8854	21/32	0.65625
2-11/16	0.2240	6-11/16	0.5573	10-11/16	0.8906	43/64	0.671875
2-3/4	0.2292	6-3/4	0.5625	10-3/4	0.8958	11/16	0.6875
2-13/16	0.2344	6-13/16	0.5677	10-13/16	0.9010	45/64	0.703125
2-7/8	0.2396	6-7/8	0.5729	10-7/8	0.9063	23/32	0.71875
2-15/16	0.2448	6-15/16	0.5781	10-15/16	0.9115	47/64	0.734375
3-	0.2500	7-	0.5833	11-	0.9167	3/4	0.750
3-1/16	0.2552	7-1/16	0.5885	11-1/16	0.9219	49/64	0.765625
3-1/8	0.2604	7-1/8	0.5938	11-1/8	0.9271	25/32	0.78125
3-3/16	0.2656	7-3/16	0.5990	11-3/16	0.9323	51/64	0.796875
3-1/4	0.2708	7-1/4	0.6042	11-1/4	0.9375	13/16	0.8125
3-5/16	0.2760	7-5/16	0.6094	11-5/16	0.9427	53/64	0.828125
3-3/8	0.2813	7-3/8	0.6146	11-3/8	0.9479	27/32	0.84375
3-7/16	0.2865	7-7/16	0.6198	11-7/16	0.9531	55/64	0.859375
3-1/2	0.2917	7-1/2	0.6250	11-1/2	0.9583	7/8	0.875
3-9/16	0.2969	7-9/16	0.6302	11-9/16	0.9635	57/64	0.890625
3-5/8	0.3021	7-5/8	0.6354	11-9/8	0.9688	29/32	0.90625
3-11/16	0.3073	7-11/16	0.6406	11-11/16	0.9740	59/64	0.921875
3-3/4	0.3125	7-3/4	0.6458	11-3/4	0.9792	15/16	0.9375
3-13/16	0.3177	7-13/16	0.6510	11-13/16	0.9844	61/64	0.953125
3-7/8	0.3229	7-7/8	0.6563	11-7/8	0.9896	31/32	0 96875
3-15/16	0.3281	7-15/16	0.6615	11-15/16	0.9948	63/64	0.984375
4-	0.3333	8-	0.6667	12-	1.0000	1"	1.000

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